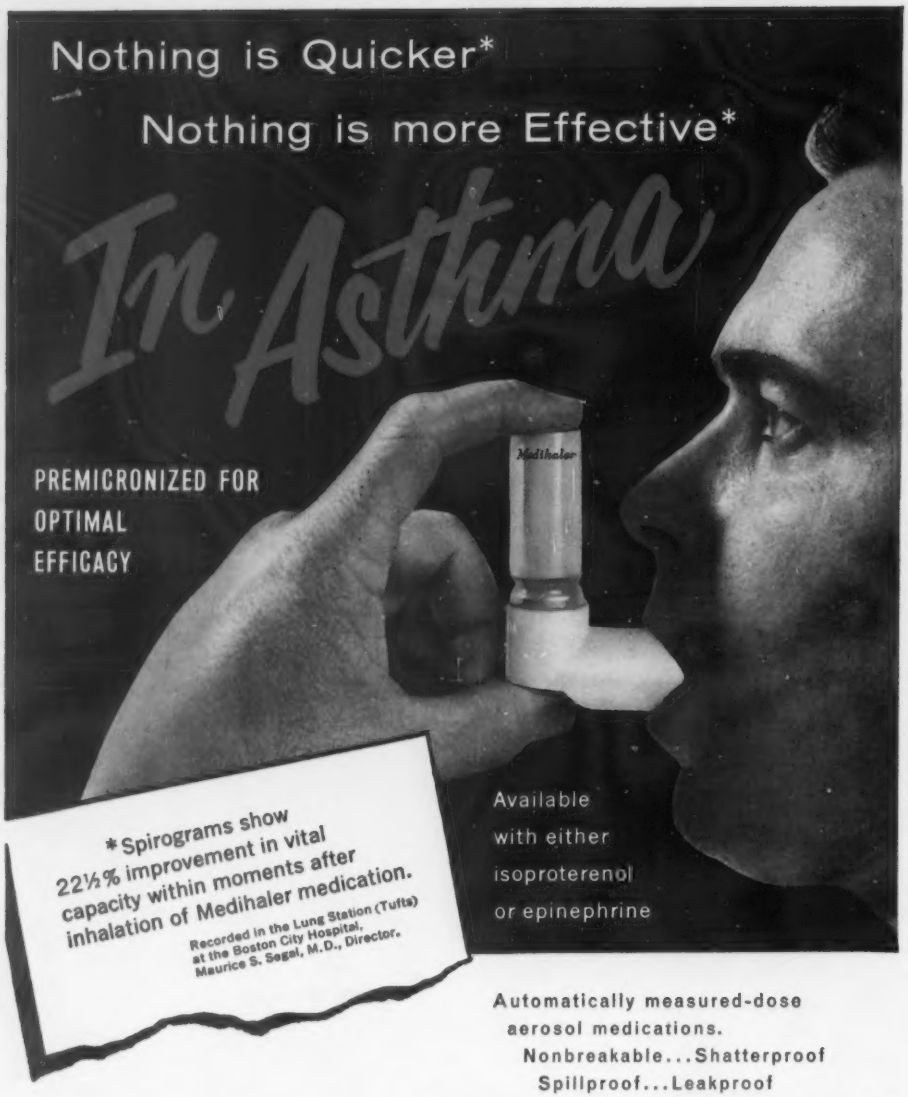
INDUSTRIAL MEDICINE *and* SURGERY

Established 1932

NOVEMBER 1959

Volume 28 Number 11



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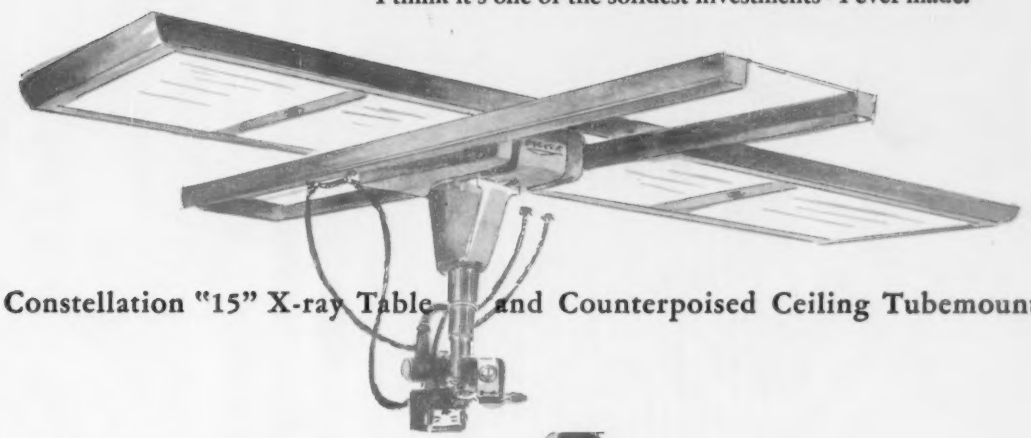

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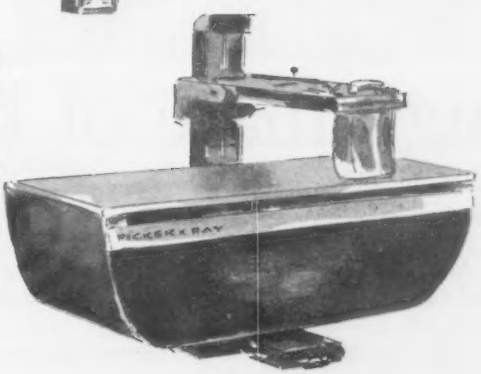

Picker x-ray

* **no capital investment if you'd rather rent ask about the PICKER RENTAL PLAN.**

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It can happen, almost without warning, to many diabetics on insulin. One moment, the patient appears normal; the next, he goes into a state of hypoglycemia, perhaps even shock. For some it is a terrifying threat with which to live.

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INDUSTRIAL MEDICINE and SURGERY

ESTABLISHED 1932

The International Journal of Medicine in Industry

NOVEMBER, 1959
VOLUME XXVIII
NUMBER 11

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PERSONAL NEWS AND NOTES

EARL E. WESTON, M.D., has been appointed Medical Director of Vickers Incorporated, Division of Sperry Rand Corporation.

Educated at University of Michigan, he received his A.B. degree in 1932, and his M.D. in 1936. He is past president of the Michigan Industrial Medical Association, past president of the Detroit Industrial Physicians Club, member of the American Medical Association, Michigan State Medical Society and the Wayne County Medical Society. He has been engaged in industrial medicine for more than 22 years and is on the medical staff of the Highland Park (Michigan) General Hospital.

J. A. MCCANNEL, M.D., has been appointed Chief Medical Officer, Massey-Ferguson Limited, Toronto.

A graduate of McGill University, DR. MCCANNEL has had experience both as general practitioner and in industrial medicine. He recently completed three years postgraduate work of academic, research and clinical training at the Institute of Industrial Health, University of Cincinnati.

DR. MCCANNEL will be responsible for the further development and extension of Massey-Ferguson medical programs in North America and special emphasis will be given to the application of preventive medicine programs in relation to industrial employment.

EDWARD C. MCKEON, M.D., has joined Mead Johnson and Company as Associate Medical Director in the nutritional and pharmaceutical division.

W. D. SNIVELY JR., M.D., vice-president and Medical Director, said DR. MCKEON will assist in evaluating efficiency of products, maintaining safety in usage, and expanding relationships with the medical profession.

He comes to Mead after six years in the Army Medical Corps. He was a pediatrician at Fitzsimons Army Hospital, Denver, Colo., in Germany, at Ft. Ord, Calif., and in the office of the Surgeon General, Washington, D. C.

He is a diplomate of the National Board of Medical Examiners, and of the American Board of Pediatrics.

DR. MCKEON is a 1947 graduate of Long Island University, and got his medical degree in 1951 from New York University. He was an intern at St. Clare's Hospital, New York, and served his residency in pediatrics at Kings County Hospital, Brooklyn, and at Fitzsimons Army Hospital.

VLADO A. GETTING, M.D., has been appointed acting Chairman of the Department of Public Health Practice, University of Michigan, to continue until "such time as a permanent chairman can be selected." DR. GETTING had been Professor of Public Health Practice at Michigan since 1953. The position as Chairman of the Department was left vacant by the retirement of Dean HENRY F. VAUGHAN.

HERBERT H. CORNISH, Ph.D., Research Associate in the Institute of Industrial Health, University of Michigan, and an Instructor in Biological Chemistry of the Michigan Medical School's Department of Dermatology, was appointed Assistant Professor of Industrial Health in the Department of Industrial Health. DR. CORNISH has been a member of the Department of Dermatology faculty since 1954 and has been with the Institute of Industrial Health since 1955. He received a Master of Science degree in 1952 and a Doctor of Philosophy degree in 1956 from the University of Michigan.

The first National Conference on the Medical Aspects of Sports, sponsored by the American Medical Association, will be held November 30, 1959, in Dallas, Texas.

The one day meeting is for college and high school athletic directors, coaches, trainers and doctors. "These are the individuals who are charged with responsibility for the health of athletes," said ALLAN J. RYAN, M.D., Meriden, Conn., Chairman of the A.M.A. Committee on the Medical Aspects of Sports.

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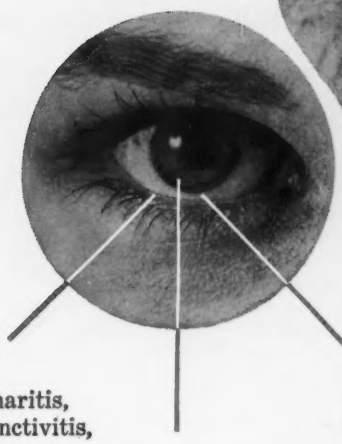

common "outer eye" disorders

allergic
(allergic blepharitis, allergic conjunctivitis, episcleritis)

traumatic
(foreign bodies, burns, abrasions, lacerations)

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DR. RYAN pointed out that the conference will deal with a wide variety of medical subjects which affect the athlete's total well being. These include training, conditioning, prevention and treatment of injuries and the physiology of exercise.

New York State Association of Industrial Nurses will present their program at the Eighth Annual Health Conference, November 6-8, 1959, at Hotel Commodore, New York City. The program will deal with three general themes: The Mechanics of Organization, The Mechanics of Modern Nursing Procedures and The Mechanics of Stress.

The Atomic Energy Commission offers fellowships which provide advanced training and on-the-job experience in the field of industrial medicine, particularly in relation to the atomic energy industry. The selection of Fellows is made by the Atomic Energy Commission on recommendation of the Committee on A.E.C. Fellowships in Industrial Medicine. For the academic year 1960-1961, eight Fellowships will be available.

The Fellowships are open to men and women physicians who are citizens of the United States, who have graduated from an approved college of medicine at least two years prior to beginning tenure of the Fellowship and who are licensed to practice medicine in one of the states or territories of the United States. Successful candidates will be required to have a full F.B.I. background investigation and to be cleared by the Commission prior to award of a Fellowship.

The training program consists of two parts: (1) an academic year, with lecture and laboratory instruction in the practice of industrial medicine, industrial hygiene, industrial toxicology, nuclear physics, biophysics, biostatistics and the public health aspects of occupational medicine. When recommended by the training school, and extension of the fellowship for a second academic year may be granted. (2) An in-plant training year, in which the Fellow will be assigned to one or more of the medical departments of the major operating plants and laboratories under the direction of the Atomic Energy Commission. Here he will have an opportunity to apply much of the material acquired during the academic phase, and to observe and participate in, under special supervision, the operation of an active industrial medical service.

Fellowship applications for the academic year 1960-1961 should be filed before January 1, 1960. The Fellowship year of academic training may be taken at a university offering an approved graduate course in industrial medicine which can provide special training facilities in the health problems associated with the Atomic Energy Program. The latter assumes a sufficient contact with the Atomic Energy Commission activities to give proper direction to this special instruction. The in-plant year of training will be given at A.E.C. contractor installations such as Oak Ridge, Tennessee; Los Alamos, New Mexico; Richland, Washington; and other areas where there are major industrial medical units.

For further information, write: A.E.C. Fellowships in Industrial Medicine, Atomic Energy Project, University of Rochester, School of Medicine, Rochester 20, N. Y., Attention Dr. Henry A. Blair.

Died

GEORGE H. GEHRMANN, M.D., F.A.C.P., on September 3, 1959, at Wilmington, Delaware. DR. GEHRMANN was born October 11, 1890. He received his M.D. degree from Long Island College of Medicine and interned at the Long Island Hospital. In 1915, at the age of 25, he was employed as plant physician at the E. I. du Pont de Nemours Company, Wilmington, Delaware, where he remained until attaining the mandatory retirement age of 65.

He was an outstanding industrial chemist and toxicologist. In 1926 he founded the Haskell Laboratory of Industrial Toxicology, which is now an important part of the Du Pont medical and research organization.

In 1943 he engaged a psychiatrist on his medical staff, recognizing in a practical way the important part emotional stress plays in the inefficient and ailing worker. Following his lead, the employment of psychiatrists on industrial medical staffs is now common practice.

In 1945 he became interested in the problem of alcoholism in industry and devised a plan for dealing with it which has proved satisfactory in rehabilitating 65% of those who were treated.

In 1955 he was presented with the William S. Knudsen Award for outstanding contributions to the field of industrial medicine.

GROVER CLEVELAND PENBERTHY, M.D., on September 2, 1959, at age 73.

In his 30 years as Surgeon-in-Chief at Childrens Hospital of Michigan he was a pioneer in treating burns on children.

DR. PENBERTHY, who started practicing in Detroit in 1913, was a staff surgeon at Harper Hospital and consulting surgeon at the Veterans Hospital in Dearborn, Bon Secours Hospital, Jennings Hospital, Sinai Hospital and Receiving Hospital. He was Professor of Surgery at Wayne State University.

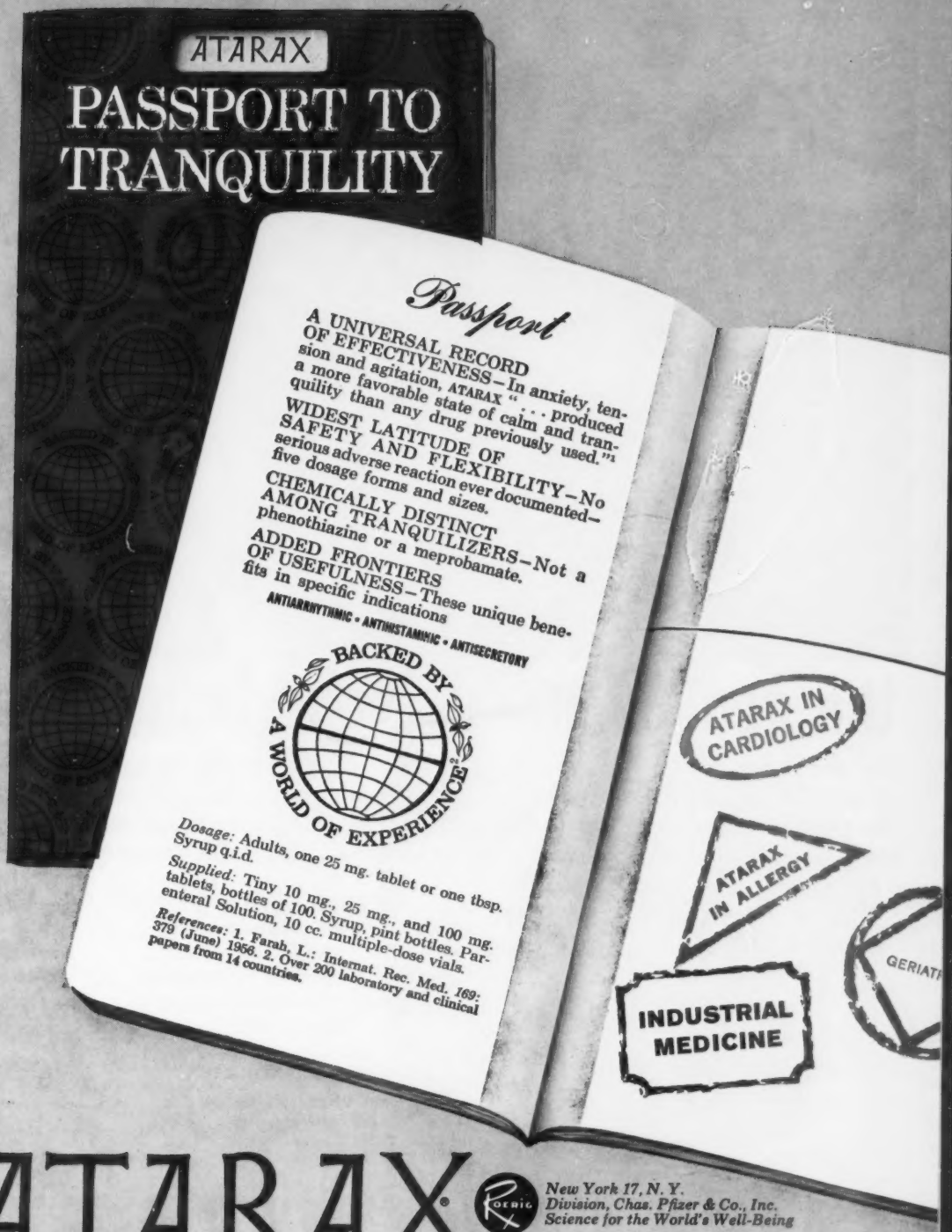
A native of Houghton, Mich., he was graduated from the University of Michigan Medical School in 1910 and spent the next three years as a surgical intern in New York.

In World War I, he was assigned to the Surgeon General's Office in Washington. In World War II, he was surgical consultant for the Seventh Service Command in Omaha, Neb.

He was a retired colonel in the Army Reserve.

DR. PENBERTHY was a former regent of the American College of Surgeons, a past president of the Central Surgical Association, a member of the Western Surgical Association and the International Society of Surgery.

He was also a delegate to the American Medical Association, chairman of its surgery section and first president of the Michigan Society for Mental Health.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References: 1. Farah, L.: Internat. Rec. Med. 169: 379 (June) 1956. 2. Over 200 laboratory and clinical papers from 14 countries.
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the complaint: "nervous indigestion"

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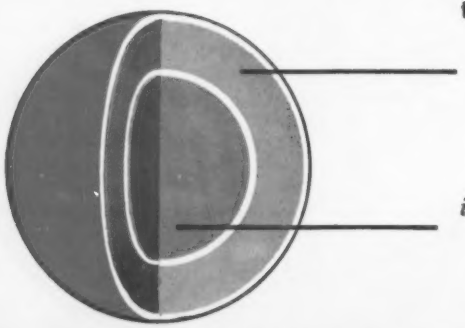

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1. Kelly, J. J., Jr.: Am. J. Med. Sci. *232*:119-128 (Aug.) 1956.

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Excellent	50	28.6%	89.7% benefited
Good	78	44.6%	
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*Steller, R. E.; DeMar, E. A., and Schwartz, F. R.: Symptomatic Treatment for Upper Respiratory Infections, Industrial Medicine and Surgery 28:362 (August) 1959.

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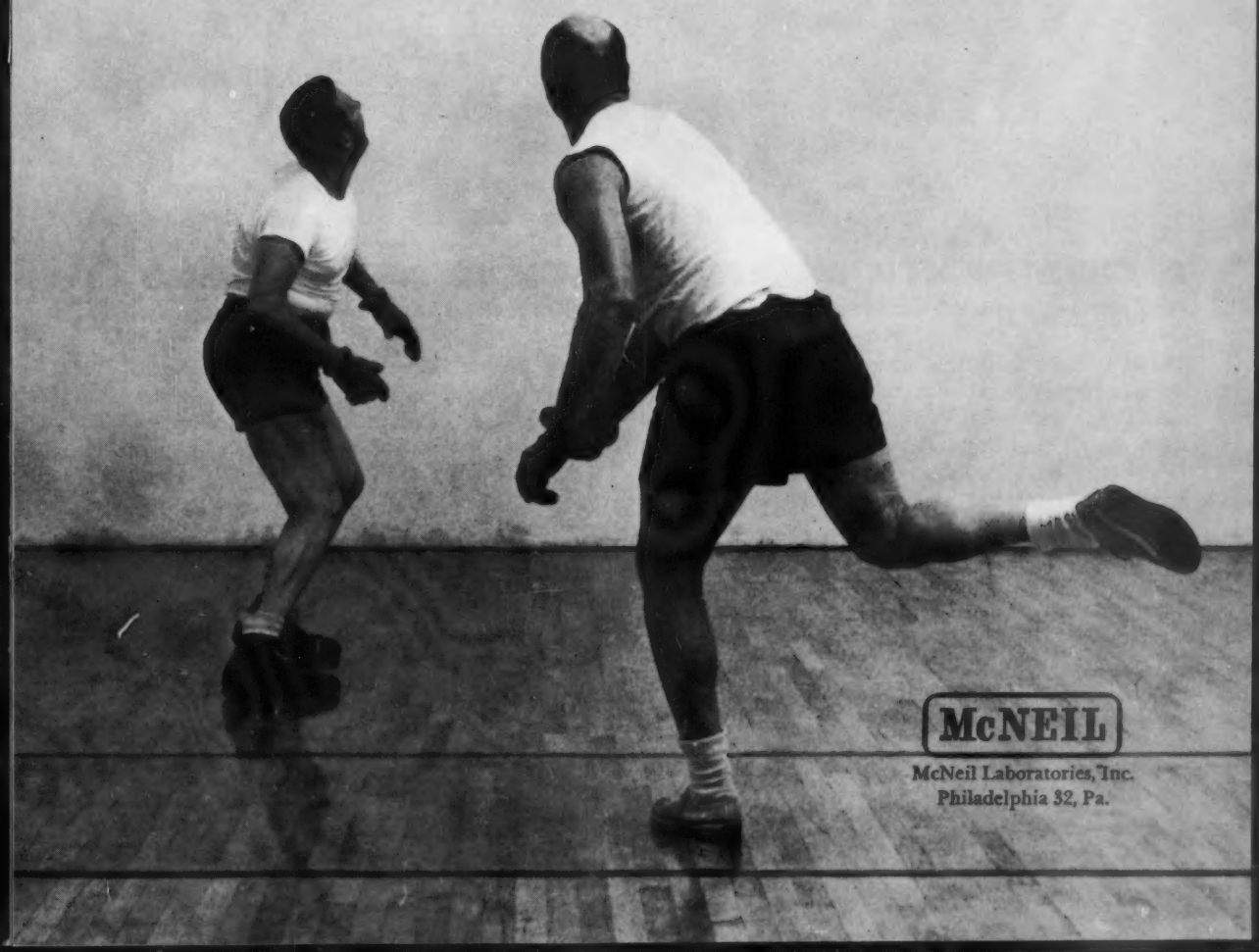
*U.S. Patent Pending 2564S9



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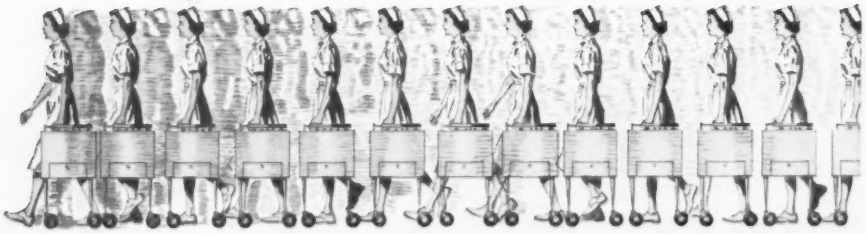

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1. Banyai, A. L.: Management of Cough in Daily Practice. *J.A.M.A.*, 148:501, Feb. 16, 1952.

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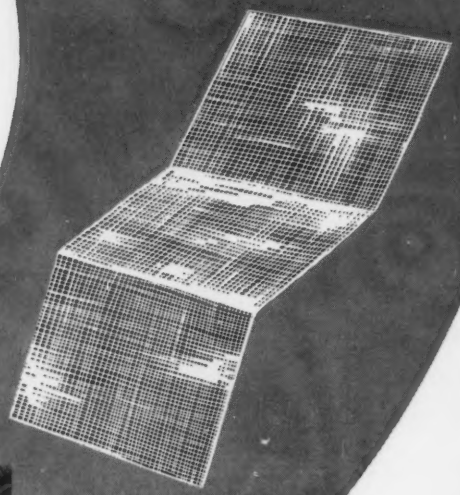

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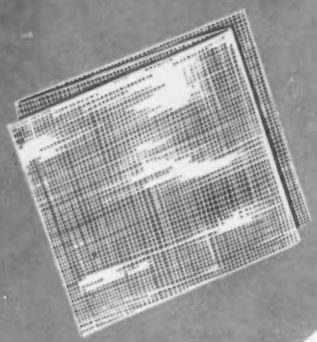


3″ x 9″ STRIP

Shorter length ends waste on small area wounds. New Z-fold insures perfect graft takes. Guaranteed sterile at time of use.

3″ x 3″ PAD

Three-ply, fine-mesh gauze, lightly impregnated — for use in physician's office, industrial medical department, first aid.

6th SIZE of VASELINE® PETROLATUM GAUZE

Now supplied in:

1/2″x 72″	3″x 18″
1″x 36″	3″x 36″
3″x 3″/ 3″x 9″	6″x 36″

Sole Maker:

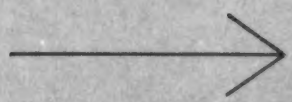
CHESEBROUGH-POND'S INC.
Professional Products Division
New York 17, N. Y.

VASELINE *is a registered trademark of Chesebrough-Pond's Inc.*

A REMINDER FROM MERCK SHARP & DOHME:

NOW IS THE TIME TO ORDER INFLUENZA VIRUS VACCINE POLYVALENT

Ordering your requirements now will assure you of sufficient vaccine when it is needed to protect your personnel and patients.



FOR YOUR CONVENIENCE, TEAR OUT AND COMPLETE THIS ORDER CARD

Postage Will be Paid by Addressee

No Postage Stamp Necessary if Mailed in the United States

BUSINESS REPLY CARD
FIRST CLASS PERMIT No. 2668, Sec. 34.9, P.L.&R. PHILADELPHIA, PA.

MERCK SHARP & DOHME
Vaccine Department
640 North Broad Street
Philadelphia 1, Penna.

To make certain that you have an adequate supply of Influenza Virus Vaccine Polyvalent when the need arises, you should order vaccine now. Order for immediate delivery or, if you prefer, at whatever future date you specify.

Vaccination against influenza is inexpensive—and is the most effective way of minimizing the risk of contracting this highly contagious disease which causes so much debilitation and absenteeism.

By anticipating your needs and ordering now, you can be certain that you will have enough vaccine for your personnel and patients.

Influenza Virus Vaccine Polyvalent

Contains the National Institutes of Health approved polyvalent strains Types A and B, including Asian Strain.

Dosage:
Detailed dosage information may be found in the package circular contained in each carton.

For complete information, write Professional Services, Merck Sharp & Dohme, West Point, Pa.

MERCK SHARP & DOHME, DIVISION OF MERCK & CO., INC., PHILADELPHIA 1, PA.

MERCK SHARP & DOHME
VACCINE DEPARTMENT
640 NORTH BROAD STREET
PHILADELPHIA 1, PENNA.

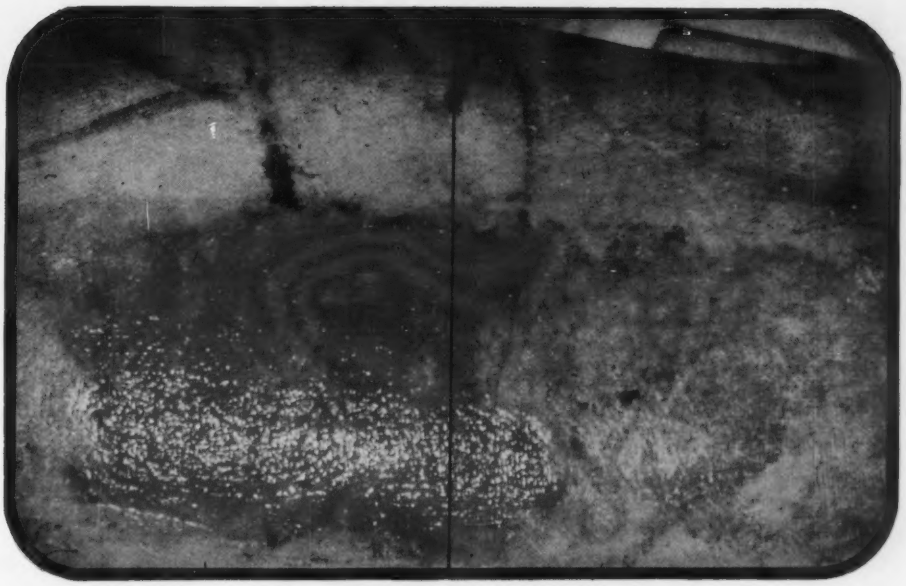
Please ship the following to arrive on _____
(specify delivery date)

_____ *10 cc. vials Influenza Virus Vaccine Polyvalent*

Ship to: _____
(Street address)
_____
(City and State)

Bill to: _____
(Street address)
_____
(City and State)

Purchase order number _____



Skin graft donor site after 2 weeks' treatment with...

petrolatum gauze—still largely granulation tissue | FURACIN gauze—completely epithelialized

OBJECTIVE EVIDENCE OF SUPERIOR WOUND HEALING

was obtained in a quantitative study of 50 donor sites, each dressed half with FURACIN gauze, half with petrolatum gauze. Use of antibacterial FURACIN Soluble Dressing, with its water-soluble base, resulted in more rapid and complete epithelialization. No tissue maceration occurred in FURACIN-treated areas. There was no sensitization.

Jeffords, J. V., and Hagerty, R. F.: Ann. Surg. *145*:169, 1957.

FURACIN®, . . . brand of nitrofurazone
the broad-range bactericide that is *gentle to tissues*

spread FURACIN Soluble Dressing: FURACIN 0.2% in water-soluble ointment-like base of polyethylene glycols.

sprinkle FURACIN Soluble Powder: FURACIN 0.2% in powder base of water-soluble polyethylene glycols. Shaker-top vial.

spray FURACIN Solution: FURACIN 0.2% in liquid vehicle of polyethylene glycols 65%, wetting agent 0.3% and water.

EATON LABORATORIES, NORWICH, N.Y.

Nitrofurans—a NEW class of antimicrobials—neither antibiotics nor sulfonamides

new for total management of itching,[1,2] inflamed,[3,4] infected[5,6] skin lesions

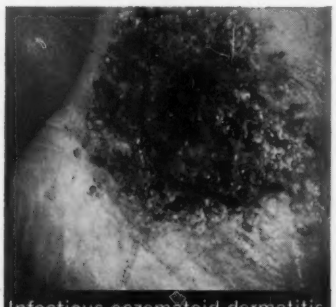
Dermatitis repens
7 weeks duration

Cleared in 5 days

Mycolog ointment

Kenalog, Spectrocin and Mycostatin in Plastibase

antipruritic/anti-inflammatory/antibacterial/antifungal



Infectious eczematoid dermatitis of ankle—5 years duration

Cleared in 20 days

Mycolog Ointment – containing the new superior topical corticoid Kenalog – reduces inflammation,[3,4] relieves itching,[1,2] and combats or prevents bacterial, monilial and mixed infections.[5-7] It is extremely well tolerated, and assures a rapid, decisive clinical response for most infected dermatoses.

> "Thirty-one of 38 patients . . . obtained excellent or good control of dermatological lesions . . . [Mycolog] was highly effective, particularly in the management of mixed infections. Several recalcitrant eruptions which had not responded to previous therapy were remarkably responsive to the daily application of this preparation over periods of 2 to 3 weeks."[5]

For total management of itching, inflamed, infected skin lesions, Mycolog contains triamcinolone acetonide, an outstanding new topical corticoid for prompt, effective relief of itching, burning and inflammation[1-4] – neomycin and gramicidin for powerful antibacterial action[7] – and nystatin for treating or preventing Candida (Monilia) albicans infections.[8,9]

Application: Apply 2 to 3 times daily. Supply: 5 Gm. and 15 Gm. tubes. Each gram supplies 1.0 mg. (0.1%) triamcinolone acetonide, 2.5 mg. neomycin base, 0.25 mg. gramicidin, and 100,000 units nystatin in PLASTIBASE.

References: 1. Shelmire, J.B., Jr.: Monographs on Therapy 3:164 (Nov.) 1958. · 2. Nix, T.E., Jr., and Derbes, V.J.: Monographs on Therapy 3:123 (Nov.) 1958. · 3. Robinson, R.C.V.: Bull. School of Med., U. Maryland 43:54 (July) 1958. · 4. Sternberg, T.H.: Newcomer, V.D., and Reisner, R.M.: Monographs on Therapy 3:115 (Nov.) 1958. · 5. Clark, R.F., and Hallett, J.J.: Monographs on Therapy, 3:153 (Nov.) 1958. · 6. Smith J.G., Jr.; Zawisza, R.J., and Blank, H.: Monographs on Therapy, 3:111 (Nov.) 1958. · 7. Monographs on Therapy, 3:137 (Nov.) 1958. · 8. Howell, C.M., Jr.: North Carolina M.J. 19:449 (Oct.) 1958. · 9. Bereston, E.S.: South. M.J. 50:547 (April) 1957.

And whatever the topical corticoid need, a suitable Squibb formulation is available—Kenalog-S Lotion—7½ cc. plastic squeeze bottles. Each cc. supplies 1.0 mg. (0.1%) triamcinolone acetonide, 2.5 mg. neomycin base and 0.25 mg. gramicidin. Kenalog Cream, 0.1%—5 Gm. and 15 Gm. tubes. Kenalog Lotion, 0.1%—15 cc. plastic squeeze bottles. Kenalog Ointment, 0.1%—5 Gm. and 15 Gm. tubes.

SQUIBB

Squibb Quality — the Priceless Ingredient

'SPECTROCIN'®, 'MYCOSTATIN'®, 'PLASTIBASE'®, 'MYCOLOG' AND 'KENALOG' ARE SQUIBB TRADEMARKS

You can expect your patients with dysmenorrhea to return to normal activity when you prescribe

THE FIRST TRUE "TRANQUILAXANT"

Trancopal®

case profile no. 3347* *A 35-year-old housewife had a history of severe dysmenorrhea and premenstrual tension:* Menarche, age 14; gravida II, Para I; menstrual cycle, fairly regular; pelvic examination, essentially negative results. The patient suffered from severe tension and irritability for from two to seven days before and during menstruation. Cramps were experienced during all three days of the menstrual periods. The analgesics provided limited symptomatic relief.

Trancopal, 200 mg. t.i.d., was prescribed for the dysmenorrhea. Result: Relief of severe cramping and accompanying irritability. *Because of these excellent results Trancopal was prescribed for premenstrual tension.* Result: Excellent response. This patient has remained on the above regimen for more than six months and no adverse effects have been noted.

Indications—Musculoskeletal: Low back pain (lumbago, sacroiliac pain, etc.); neck pain (torticollis); bursitis; rheumatoid arthritis; osteoarthritis; disc syndrome; fibrositis; ankle sprain; tennis elbow; myositis; postoperative muscle spasm. Psychogenic: Anxiety and tension states; dysmenorrhea; premenstrual tension; asthma; angina pectoris; alcoholism.

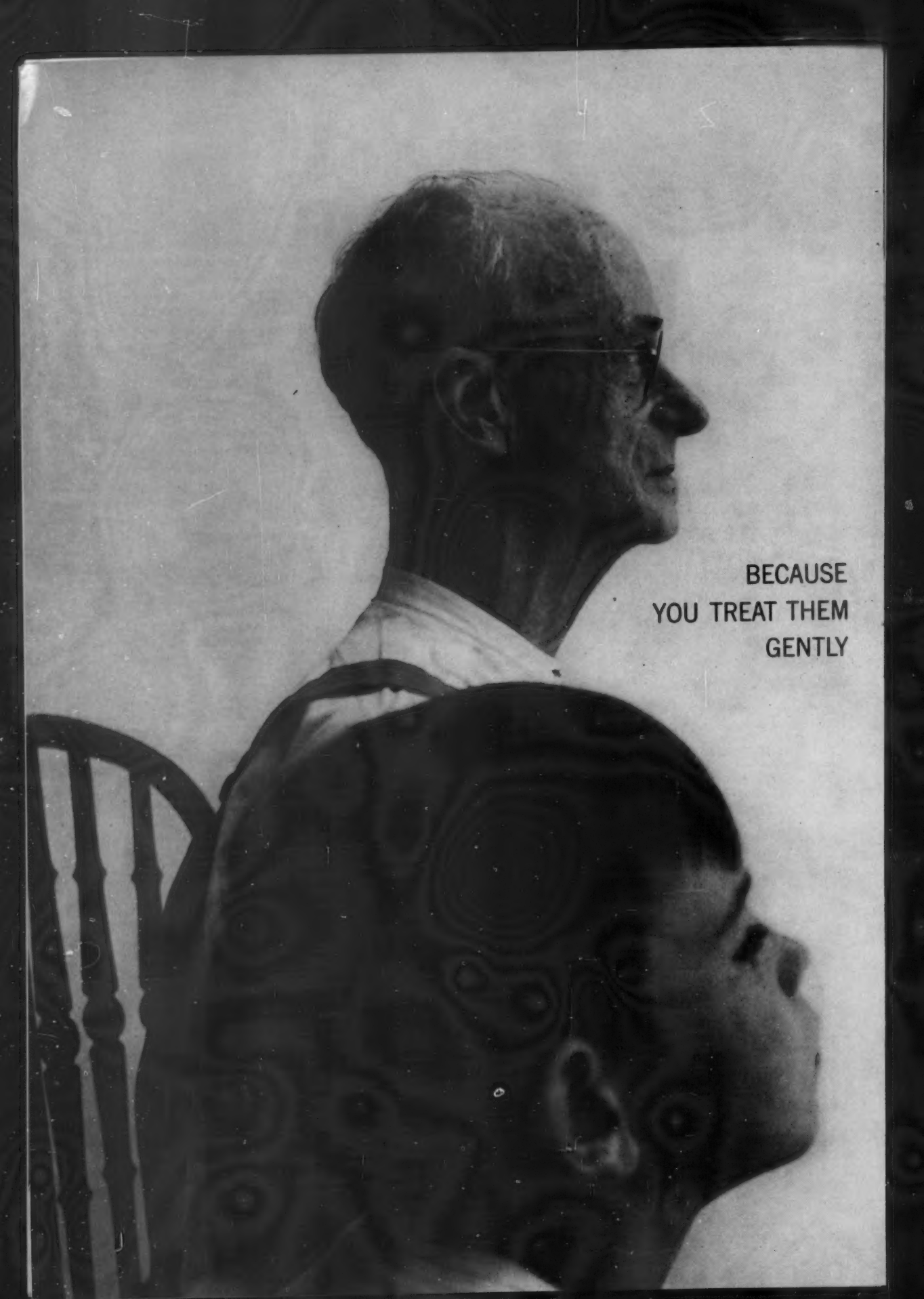
Dosage: 100 or 200 mg. orally three or four times daily. Relief of symptoms occurs in fifteen to thirty minutes and lasts from four to six hours.

How Supplied: Now available in two strengths. Trancopal Caplets®, 100 mg. (peach colored, scored), bottles of 100. New Strength—Trancopal Caplets, 200 mg. (green colored, scored), bottles of 100.

Winthrop LABORATORIES
NEW YORK 18, N.Y.

*Clinical Report on file at the Department of Medical Research, Winthrop Laboratories.

Trancopal (brand of chlormezanone) and Caplets, trademarks reg. U.S. Pat. Off. 1406M


BECAUSE
YOU TREAT THEM
GENTLY

"In no case...
was there any rebound congestion."[1]

Your youngest patient as well as your oldest will find new Otrivin an unusually gentle yet remarkably effective nasal decongestant. Otrivin works quickly; its action is prolonged. Typical of many clinicians' reports is the one published by Kolodny[1]: Of 64 patients studied, 92 per cent had good or excellent results. "In no case studied was there any rebound congestion. Local side effects were minimal. . . . Extremely few systemic effects occurred. . . ."

NEW
OTRIVIN® FOR GENTLE RELIEF OF STUFFY NOSE
ON PRESCRIPTION ONLY

Otrivin is safe even for the very young. "The particularly striking feature of Otrivin solution was the absence of side effects, even in infants as young as two weeks."[2] "It is effective in low concentrations and is a safe nasal vasoconstrictor for even the young patient."[3]

SUPPLIED: Otrivin *Nasal Solution*, 0.1%; dropper bottles of 1 ounce. Otrivin *Nasal Spray*, 0.1%; plastic squeeze tubes of 15 ml. Otrivin *Pediatric Nasal Spray*, 0.05%; plastic squeeze tubes of 15 ml.

REFERENCES: 1. Kolodny, A. L.: Antibiotic Med. *6*:452 (Aug.) 1959. 2. Davis, M. R.: To be published. 3. Peluse, S.: In press.

Otrivin® hydrochloride (xylometazoline hydrochloride CIBA) 2/2753HK

CIBA SUMMIT, N. J.

NOW

...a new way to relieve pain and stiffness in muscles and joints

INDICATED IN:

MUSCLE STIFFNESS

LUMBOSACRAL STRAIN

SACROILIAC STRAIN

WHIPLASH INJURY

BURSITIS

SPRAINS

TENOSYNOVITIS

FIBROSITIS

FIBROMYOSITIS

LOW BACK PAIN

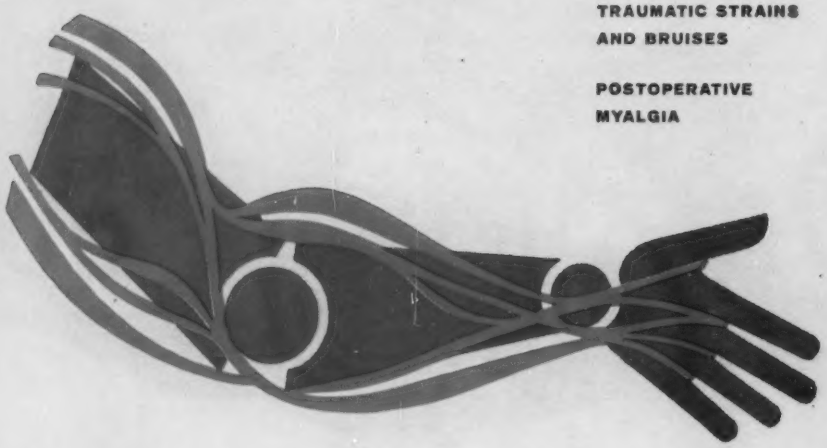
DISC SYNDROME

SPRAINED BACK

"TIGHT NECK"

TRAUMATIC STRAINS AND BRUISES

POSTOPERATIVE MYALGIA



■ Exhibits unusual analgesic properties, different from those of any other drug ■ Specific and superior in relief of SOMAtic pain ■ Modifies central perception of pain without abolishing natural defense reflexes ■ Relaxes abnormal tension of skeletal muscle

SOMA™

N-isopropyl-2-methyl-2-propyl-1, 3-propanediol dicarbamate

■ More specific than salicylates ■ Less drastic than steroids

■ More effective than muscle relaxants

SOMA has an unique analgesic action. It apparently modifies central pain perception without abolishing peripheral pain reflexes. SOMA is particularly effective in relieving joint pain. Patients say that they feel better and sleep better with SOMA than with any previously used analgesic, sedative or relaxant drug.
SOMA also relaxes muscle hypertonia, with its stresses on related joints, ligaments and skeletal structures.

ACTS FAST. Pain-relieving and relaxant effects start in 30 minutes and last 6 hours.

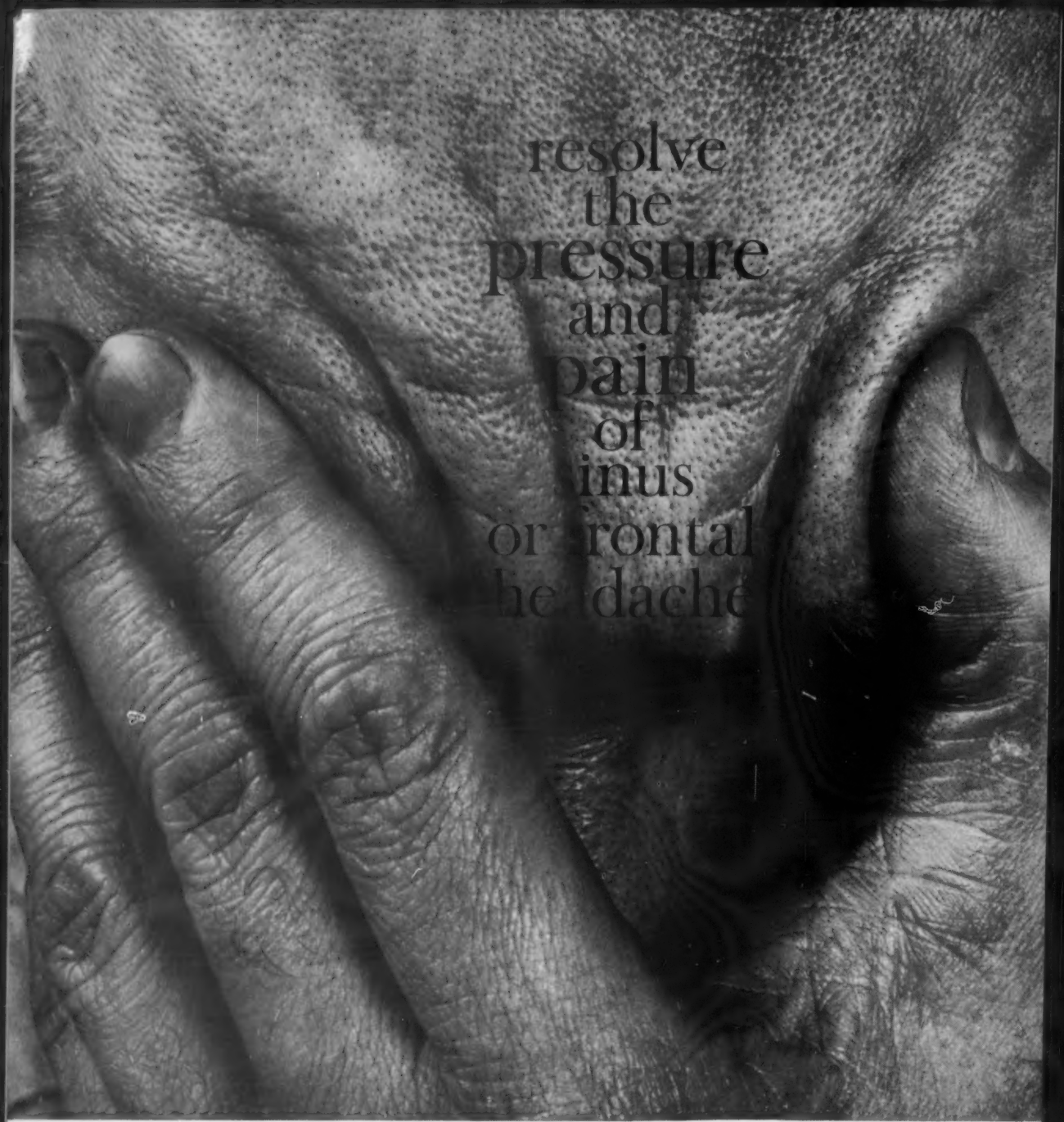
NOTABLY SAFE. Toxicity of SOMA is extremely low. No effects on liver, endocrine system, blood pressure, blood picture or urine have been reported. Some patients may become sleepy on high dosage.

EASY TO USE. Usual adult dose is one 350 mg. tablet 3 times daily and at bedtime.

SUPPLIED: Bottles of 50 white sugar-coated 350 mg. tablets.

Literature and samples on request.

WALLACE LABORATORIES, NEW BRUNSWICK, N. J.



with new Sinutab*

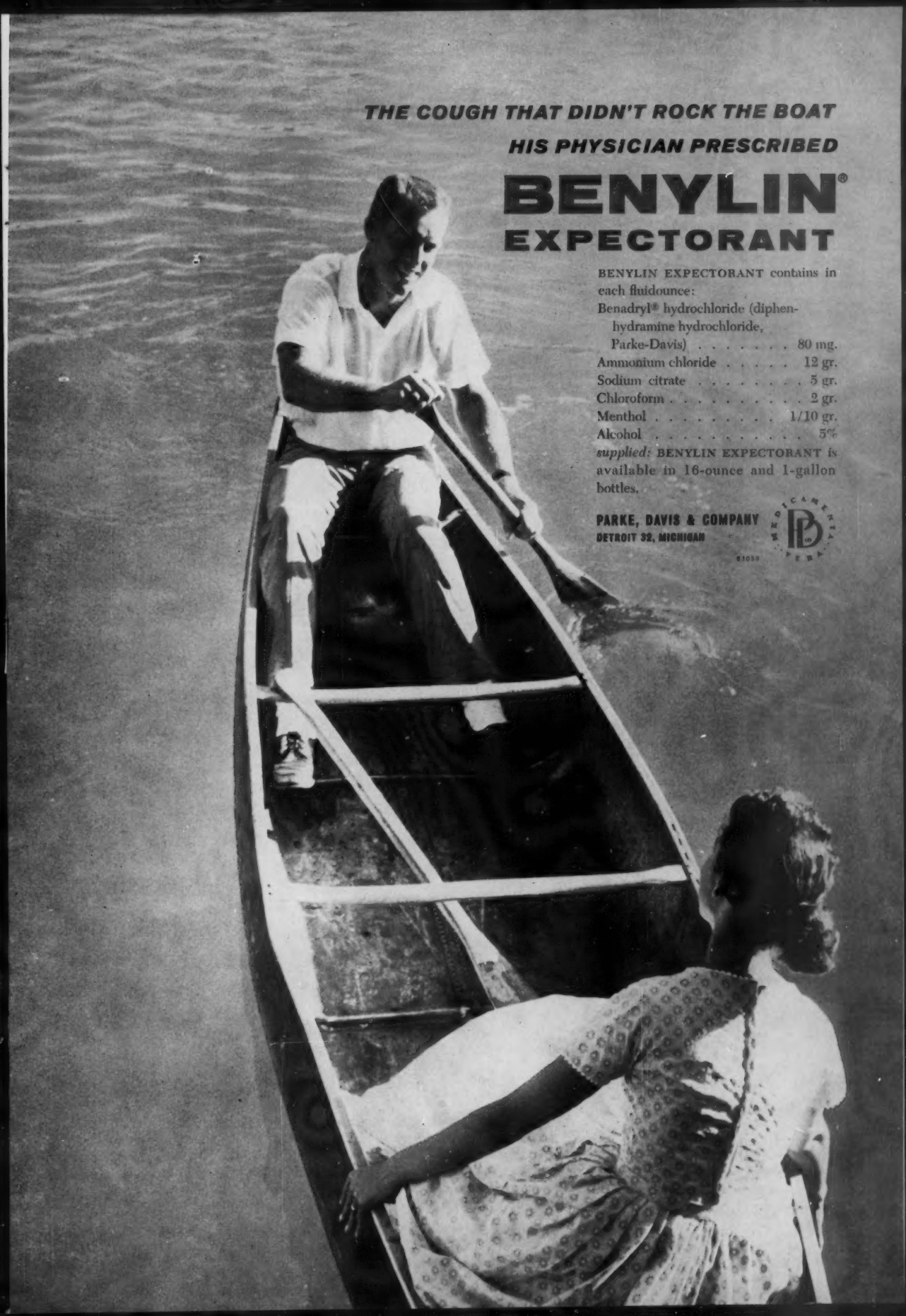
Sinutab aborts pain, decongests and provides patient-comfort

Sinutab aborts pain with two analgesics, systemically opens air passages to relieve stuffiness and congestion and provides patient-comfort with mild tranquilization.

DOSAGE: *Adults,* two tablets every four hours. Prophylactically, one tablet every four hours. *Children 6 to 12 years,* one-half adult dose. SUPPLIED: Bottles of 30 tablets. SINUTAB FORMULATION: N-acetyl-para-aminophenol (APAP), 150 mg., (2½ gr.); Acetophenetidin, 150 mg., (2½ gr.); Phenylpropanolamine HCl, 25 mg., (⅜ gr.); Phenyltoloxamine Dihydrogen Citrate, 22 mg., (⅓ gr.)

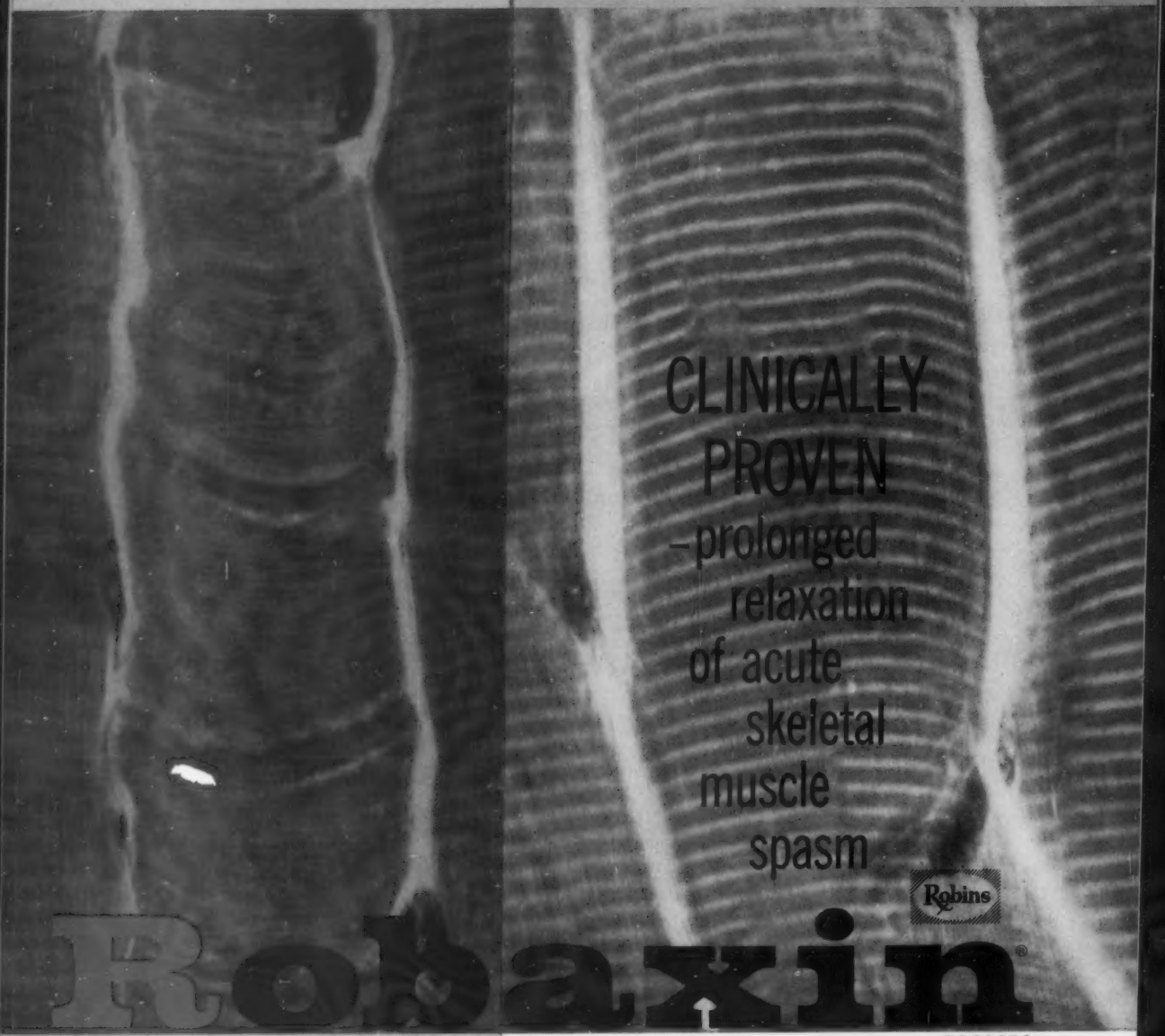
WARNER CHILCOTT
MORRIS PLAINS, N.J.

*TRADEMARK


THE COUGH THAT DIDN'T ROCK THE BOAT
HIS PHYSICIAN PRESCRIBED
BENYLIN®
EXPECTORANT
BENYLIN EXPECTORANT contains in each fluidounce:
Benadryl® hydrochloride (diphenhydramine hydrochloride, Parke-Davis) . . . . . 80 mg.
Ammonium chloride . . . . . 12 gr.
Sodium citrate . . . . . 5 gr.
Chloroform . . . . . 2 gr.
Menthol . . . . . 1/10 gr.
Alcohol 5%
supplied: BENYLIN EXPECTORANT is available in 16-ounce and 1-gallon bottles.
PARKE, DAVIS & COMPANY
DETROIT 32, MICHIGAN
MEDICAMENTA VERA
83050

Fiber of skeletal muscle in spasm

Fiber of skeletal muscle relaxed *(photomicrographs)*



Methocarbamol Robins U.S. Pat. No. 2770649

TABLETS

Summary of six published clinical studies:

ROBAXIN BENEFICIAL IN 92.4% OF SKELETAL MUSCLE SPASM CASES

	NO. PATIENTS	RESPONSE			
		"marked"	moderate	slight	none
Carpenter[1]	33	26	6	1	—
		"pronounced"			
Forsyth[2]	58	37	20	—	1
		"good"			
Lewis[3]	38	25	6	—	7
O'Doherty &		"excellent"			
Shields[4]	17	14	2	1	0
		"significant"			
Park[5]	30	27	—	2	1
		"gratifying"			
Plumb[6]	60	55	—	—	5
TOTALS	236	184 (78.0%)	34 (14.4%)	4	14

- **Highly potent—and long acting.**[1,2,3]
- **Relatively free of adverse side effects.**[1,2,3,5,6]
- **In ordinary dosage, does not reduce muscle strength or reflex activity.**[1]

REFERENCES: 1. Carpenter, E. B.: Southern M. J. 51:627, 1958. 2. Forsyth, H. F.: J.A.M.A. 167:163, 1958. 3. Lewis, W. B.: California Med. 90:26, 1959. 4. O'Doherty, D. S., and Shields, C. D.: J.A.M.A. 167:160, 1958. 5. Park, H. W.: J.A.M.A. 167:168, 1958. 6. Plumb, C. S.: Journal-Lancet 78:531, 1958.

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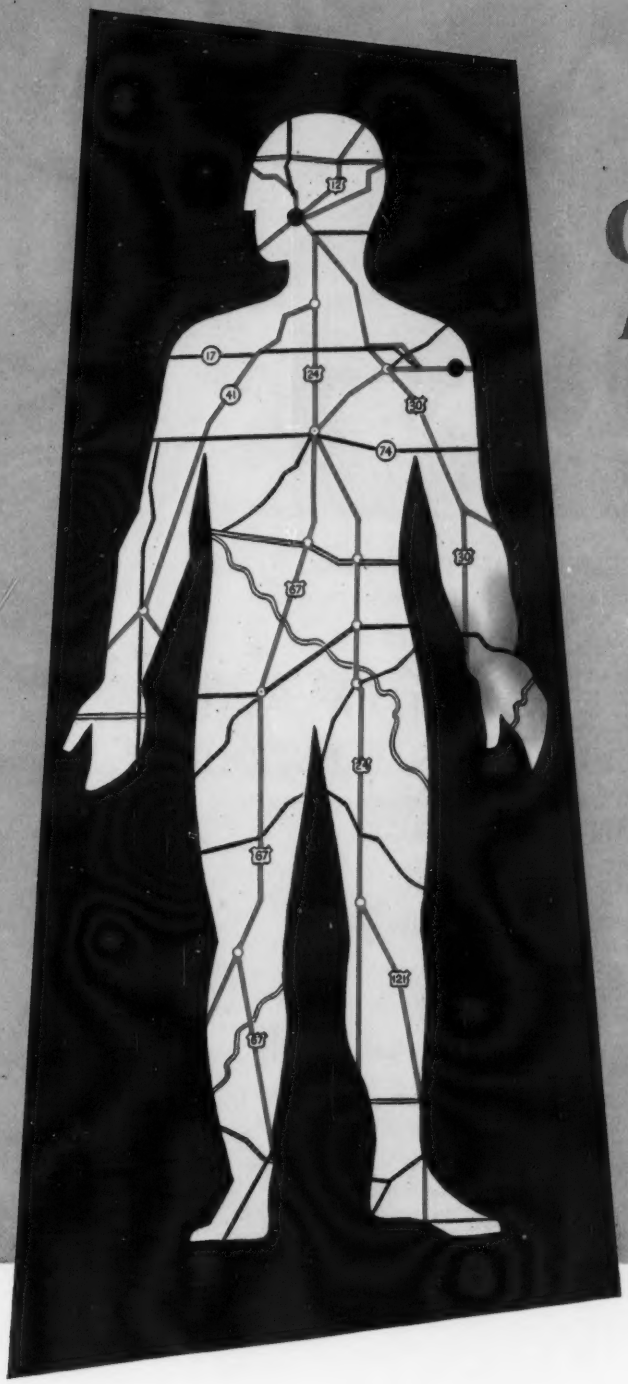
Ethical Pharmaceuticals of Merit since 1878

faster
healing
at any location



CHYMAR®

Buccal | Aqueous | Oil

superior anti-inflammatory enzyme

in industrial accidents controls inflammation, swelling and pain

Chymar prevents or reduces all types of inflammatory changes. It quickly dissipates edema and blood extravasates to improve local circulation, accelerate healing, relieve pain. Side effects that have been observed with steroid-type anti-inflammatory agents do not occur with Chymar.

Chymar is effective as routine first aid in:

major sprains • fractures • bruises
contusions • hematomas • wounds

CHYMAR *Buccal*—Crystallized chymotrypsin in a tablet formulated for buccal absorption. Bottles of 24 tablets. Enzymatic activity, 10,000 Armour Units per tablet.

CHYMAR *Aqueous*—Solution of crystallized chymotrypsin in sodium chloride injection for intramuscular use. Vials of 5 cc. Enzymatic activity, 5000 Armour Units per cc.

CHYMAR—Suspension of crystallized chymotrypsin in oil for intramuscular injection. Vials of 5 cc. Enzymatic activity, 5000 Armour Units per cc.

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Armour Means Protection

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NEW

1 mg. Tablets

STELAZINE*

brand of trifluoperazine

For b.i.d. administration

FOR ANXIETY–
PARTICULARLY WHEN EXPRESSED AS APATHY,
LISTLESSNESS AND EMOTIONAL FATIGUE

5 SIGNIFICANT ADVANTAGES

*

often effective where other agents fail

*

enthusiastic patient acceptance

*

fast therapeutic response with very low oral doses

*

convenient b.i.d. administration

*

side effects usually slight and transitory

*Trademark

Clinically evaluated, before introduction, in over 12,000 patients

SMITH
KLINE &
FRENCH

UNUSUALLY EFFECTIVE IN RELIEVING ANXIETY IN APATHETIC, EMOTIONALLY FATIGUED PATIENTS

'Stelazine' is a new long-acting psychotherapeutic agent that can help you to bring prompt relief to many of your patients whose anxiety is expressed as apathy, listlessness and emotional fatigue.

Clinical studies in over 12,000 patients have shown that 'Stelazine' is outstanding among agents in its class because it not only relieves agitation and tension, but also *restores normal drive* in many patients who are apathetic due to anxiety.

These studies have also shown that 'Stelazine' is effective in low b.i.d. dosage (2 to 4 mg. daily) and that it is often effective in patients who have failed to respond to meprobamate, prochlorperazine, phenobarbital, mepazine, chlorpromazine, or promazine.

RECOVERY OF NORMAL DRIVE IN APATHETIC PATIENTS

Clinicians report that with 'Stelazine' most apathetic, listless and emotionally fatigued patients regain an alert, more confident outlook. This frequently results in increased mental and physical activity. For example:

> Patients' "spirits brightened and initiative and interest picked up considerably in contrast to their pretreatment inertia."[1]
>
> 'Stelazine' "seemed to have a capacity to restore normal drive in conditions characterized by decreased motor activity and mental apathy."[2]

ADDITIONAL INFORMATION will reach you by mail or through your S.K.F. representative. We hope you'll decide that 'Stelazine' deserves an early trial. Smith Kline & French Laboratories, Philadelphia.

REFERENCES: 1. Gearren, J.B.: Dis. Nerv. System *20*:66 (Feb.) 1959. 2. Margolis, E.J., et al.: Scientific Exhibit at 12th Clinical Meeting of the American Medical Association, Minneapolis, Dec. 2-5, 1958. 3. Phillips, F.J., and Shoemaker, D.M.: *ibid.* 4. Ayd, F.J., Jr.: Clin. Med. *6*:387 (Mar.) 1959. 5. Tedeschi, D.H., et al.: in *Trifluoperazine: Clinical and Pharmacological Aspects*, Philadelphia, Lea & Febiger, 1958, pp. 23-33.

leaders in psychopharmaceutical research

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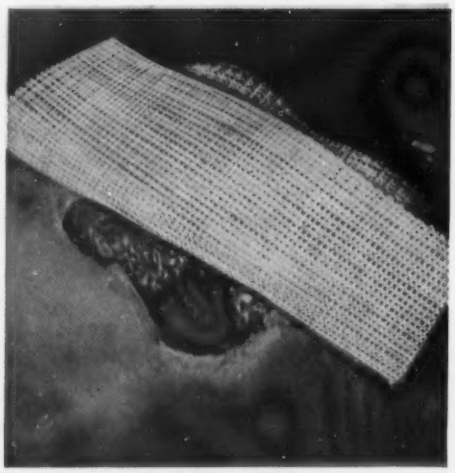
Versatile **ADAPTIC**® Non-Adhering Dressing Now Available in 6 Sizes—

Effective on Any Type of Lesion

STERILE. Avoids tissue damage, and pain of removal.
Special porous weave prevents maceration, keeps lesions dry and healthy.

Sizes: 3″ x 3″, 3″ x 8″, 3″ x 16″, easily dispensed from peel-back packages.
Also, STERILE ADAPTIC® Packing Strips in ½″, 1″, 2″ widths.



See how easily ADAPTIC Non-Adhering Dressing is removed. Adherence is prevented by a special, bland emulsion which does not clog pores of the viscose filaments.

◀ Free dispenser with 3″ x 3″ office size.

Johnson-Johnson © J & J 1958

he'll be under way again soon, once he's on

PARAFON®

(PARAFLEX® + TYLENOL®)

for muscle relaxation plus analgesia

prescribe PARAFON in low back pain—sprains—strains—rheumatic pains

Each PARAFON tablet contains:

PARAFLEX® Chlorzoxazone† ..... 125 mg.

Specific for skeletal muscle spasm

TYLENOL® Acetaminophen ..... 300 mg.

The analgesic preferred in musculoskeletal pain

Dosage: Two tablets t.i.d. or q.i.d.

Supplied: Tablets, scored, pink, bottles of 50.

and in arthritis

PARAFON®

with Prednisolone

Each PARAFON WITH PREDNISOLONE tablet contains: PARAFLEX® Chlorzoxazone† 125 mg., TYLENOL® Acetaminophen 300 mg., and prednisolone 1.0 mg.

Dosage: One or two tablets t.i.d. or q.i.d.

Supplied: Tablets, scored, buff colored, bottles of 36.

Precautions: The precautions and contraindications that apply to all steroids should be kept in mind when prescribing PARAFON WITH PREDNISOLONE.

*sailor

†U. S. Patent Pending

McNEIL

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WHITE'S VITAMIN A & D OINTMENT

* HEALS * SOOTHES * PROTECTS

Before application of White's Vitamin A & D Ointment—Second and third degree burns caused by flaming gasoline.

After pressure gauze dressings of White's Vitamin A & D Ointment—changed at weekly intervals—Complete healing with minimal scar tissue and no contractures.

Before application of White's Vitamin A & D Ointment—Treatment-resistant varicose ulcer in elderly obese patient.

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Before applications of White's Vitamin A & D Ointment—Severe pressure sore in area over greater tuberosity of femur.

After daily treatment with White's Vitamin A & D Ointment—The sore is now filled with granulation tissue and shows signs of re-epithelization at margins.

Supplied in 1½ and 4 oz. tubes; 1 lb. jars and 5 lb. containers.

WHITE LABORATORIES, INC., KENILWORTH, NEW JERSEY

in peptic ulcer...

KEEPS THE MIND OFF THE STOMACH

...THE STOMACH FREE OF PAIN

direct antispasmodic action plus control of anxiety and tension

NOW...
2 Milpath forms for adjustability of dosage

MILPATH-400—Yellow, scored tablets of 400 mg. meprobamate and 25 mg. tridihexethyl chloride (formerly supplied as the iodide). Bottle of 50.
DOSAGE: 1 tablet t.i.d. at mealtime and 2 at bedtime.

MILPATH-200—Yellow, coated tablets of 200 mg. meprobamate and 25 mg. tridihexethyl chloride. Bottle of 50.
DOSAGE: 1 or 2 tablets t.i.d. at mealtime and 2 at bedtime.

Milpath®

®Miltown + *anticholinergic*

WALLACE LABORATORIES *New Brunswick, N. J.*

New ORAL DECONGESTANT

DRISTAN®

TABLETS

afford a new degree of symptomatic relief from

- **SINUSITIS**
- **THE COMMON COLD**
- **ALLERGIC DISORDERS**

Minimizes the Hazard of Drowsiness on the Job

as compared with other preparations containing antihistamines

Unique 3-layer decongestant tablet development offers a combination of ingredients never before possible to put into a single tablet.

DRISTAN—*Faster In Therapeutic Action*

Regular Enteric Coated Tablet	3-Layer Uncoated Dristan Tablet
Disintegrates in 3 hours	Disintegrates in 7 minutes

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(4) Approved APC formula . . . aspirin, phenacetin and caffeine.

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References: Annals of Allergy, Vol. 6. July-August 1948. Study of a New Histamine Antagonist, The Pennsylvania Med. J., Vol. 51. Clinical Study of a New Antihistaminic Drug—Phenindamine. Dristan Clinical Study.

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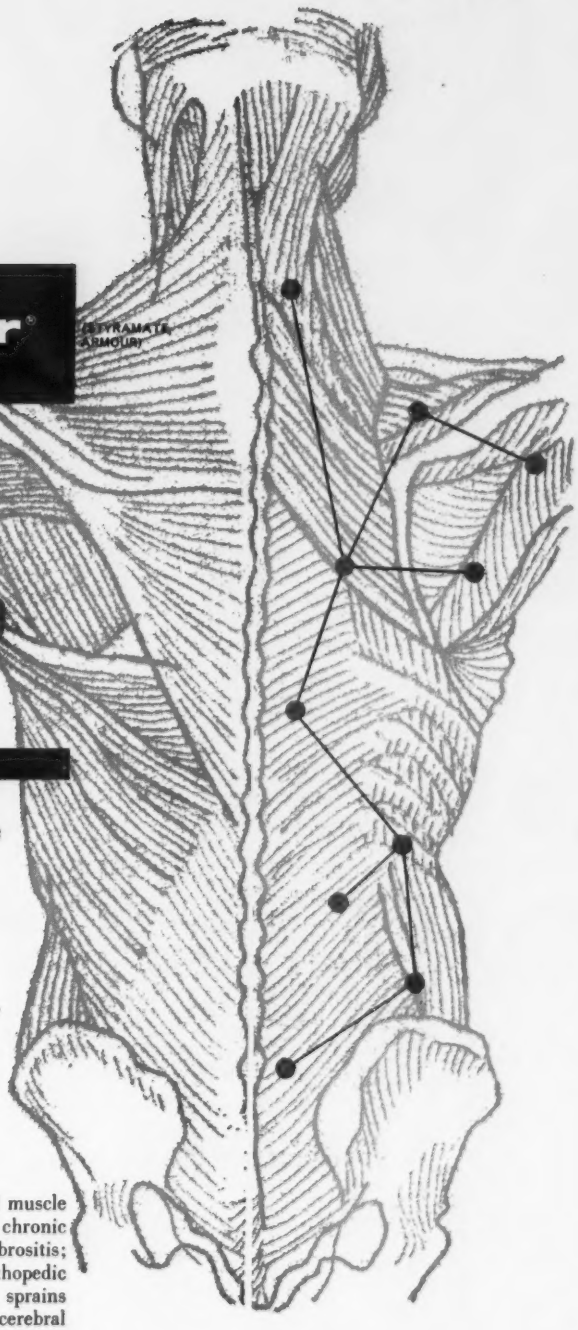

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SUPPLIED: *200 mg. tablets in bottles of 50.*

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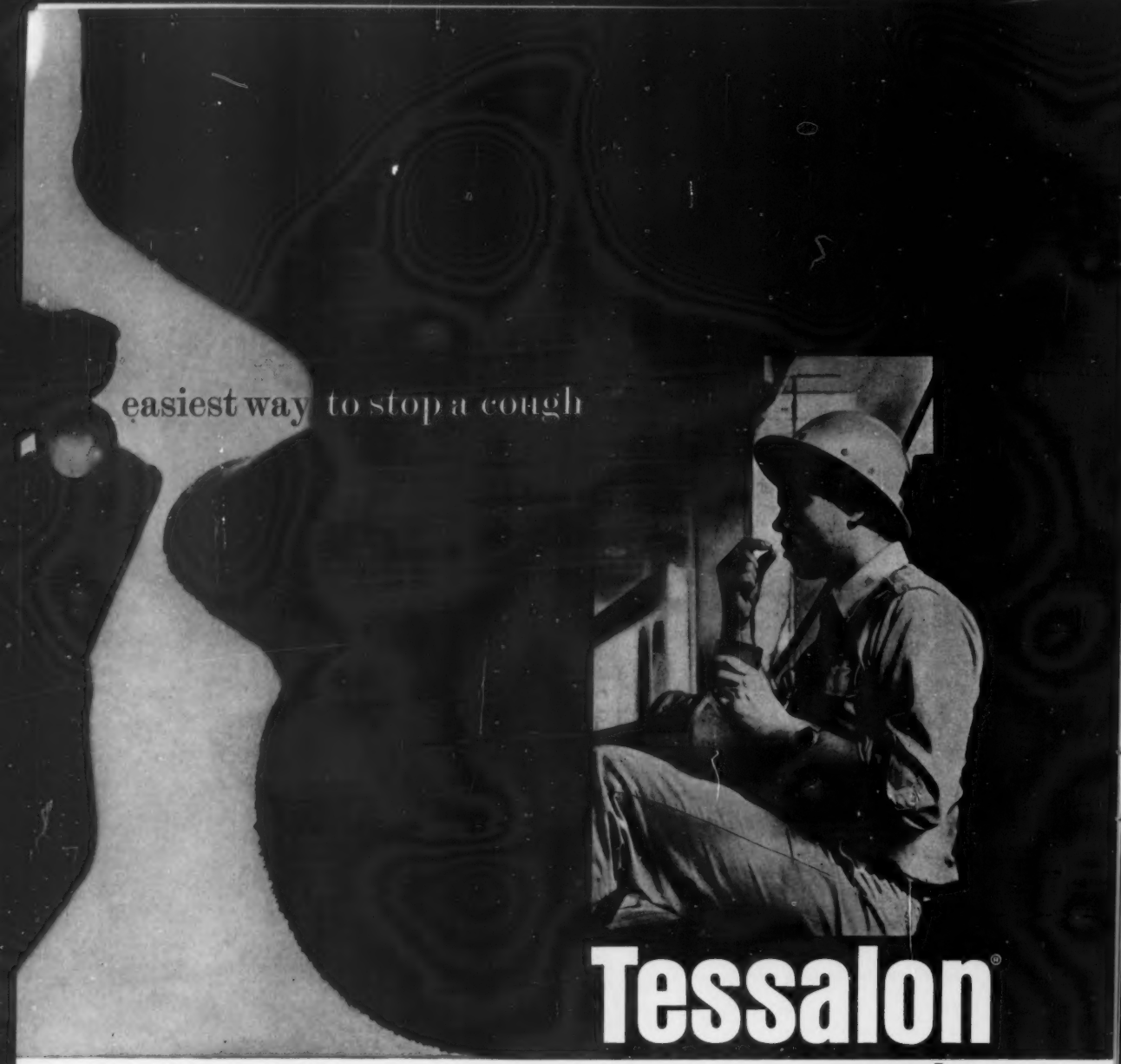

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1. Shane, S. J., Krzyski, T. K., and Copp, S. E.: Canad. M. A. J. 77:600 (Sept. 15) 1957.

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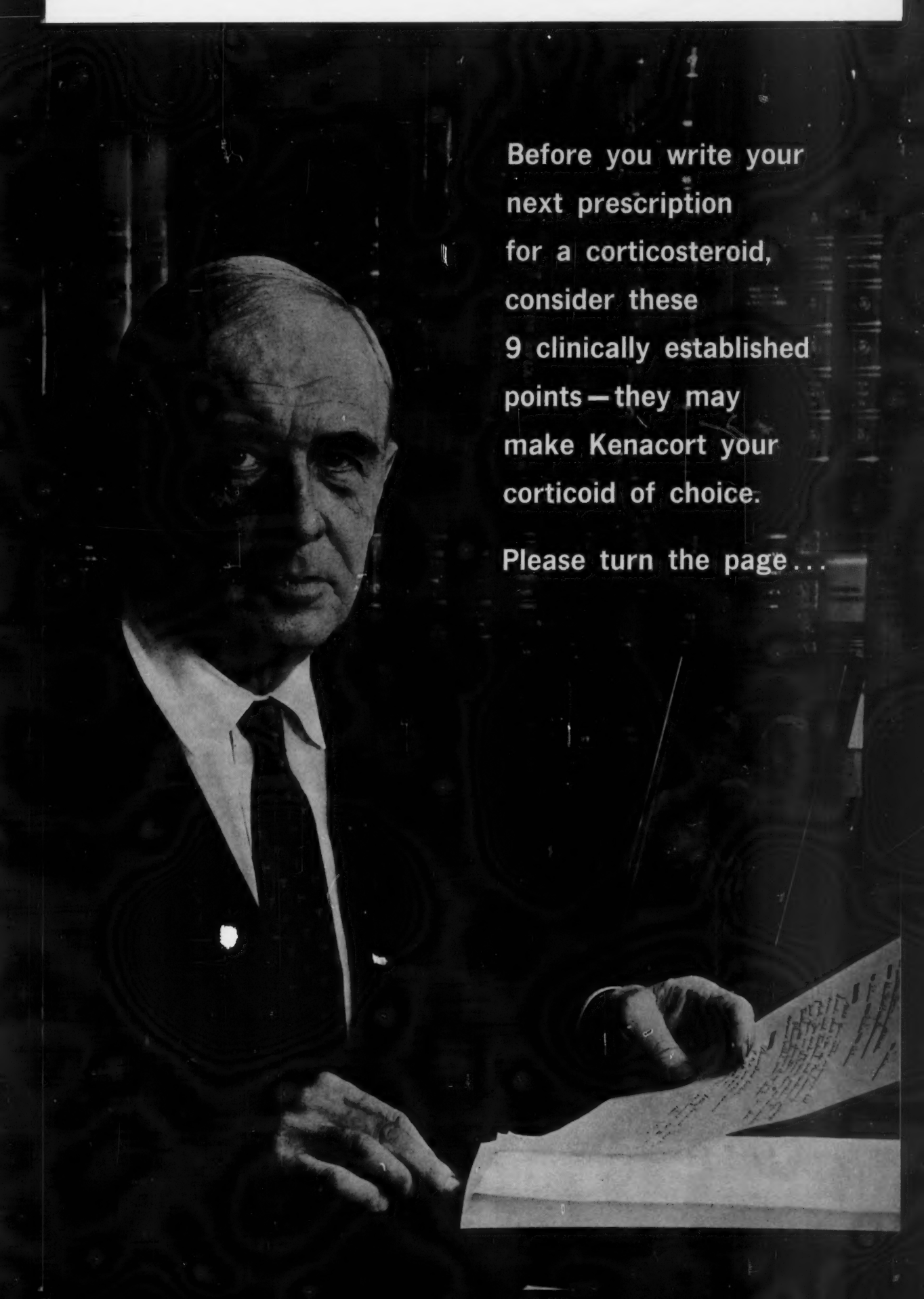
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initial therapy—remarkably free from complications

Allison, J. R., Sr., and Allison, J. R., Jr.: Monographs on Therapy 3:99 (Oct.) 1958.

pre-prescription point number **2**

continuing therapy—maintenance doses are low

Feinberg, S. M.; Feinberg, A. R., and Fisherman, E. W.: J. A. M. A. 167:58 (May 3) 1958.

pre-prescription point number **3**

no sodium or water retention—low salt diet not necessary

Hartung, E. F.: J. A. M. A. 167:973 (June 21) 1958.

pre-prescription point number **4**

absence of edema

Council on Drugs: J. A. M. A. 169:257 (Jan. 17) 1959.

pre-prescription point number **5**

less likely to create electrolyte disturbance

Bongiovanni, A. M.; Mellman, W. J., and Eberlein, W. R.: J. Pediat. 53:3 (July) 1958.

pre-prescription point number **6**

no secondary hypertension—no significant change in pulse, respiration, or blood pressure

Shelley, W. B.; Harun, J. S., and Pillsbury, D. M.: J. A. M. A. 167:959 (June 21) 1958.

Bernsten, C. A., Jr., and others: New York Rheumatism Association, Annual Meeting, New York, April 9, 1959.

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Available in 1 mg., 2 mg., and 4 mg. scored tablets.

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Council on Drugs:
J. A. M. A. 169:257 (Jan. 17) 1959.

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Shelley, W. B.; Harun, J. S., and Pillsbury, D. M.;
J. A. M. A. 167:959 (June 21) 1958.
Council on Drugs:
J. A. M. A. 169:257 (Jan. 17) 1959.

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Hartung, E. F.:
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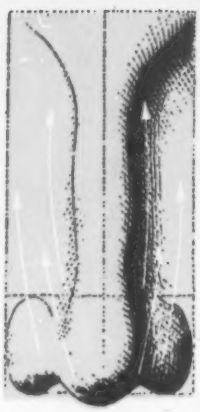

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Also, **Biomydrin® F nasal spray** with hydrocortisone alcohol 0.02%—useful in the most stubborn cases of edema and inflammation. 15 ml. atomizer.

How many patients today complained about pain?

non-narcotic—pain relief equivalent to that of codeine

well tolerated in both acute and prolonged use

wide range of indications—general practice and the specialties

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Supplied: Tablets, bottles of 48. Each tablet contains 75 mg. of ethoheptazine citrate and 325 mg. (5 grains) of acetylsalicylic acid.

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BREAKTHROUGH IN THE TREATMENT OF RINGWORM INFECTIONS

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ORALLY EFFECTIVE IN FUNGOUS INFECTIONS OF SKIN, HAIR, AND NAILS[1-4]

DRAMATIC IMPROVEMENT IN TRADITIONALLY REFRACTORY RINGWORM INFECTIONS

Tinea of the toenails of 7 years' duration—after 4 months of treatment with GRIFULVIN. Infecting organism, **Trichophyton rubrum.**

Same patient after 6 months of treatment with GRIFULVIN. Infection has cleared; healthy nail growth is almost complete.

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- *Tinea corporis* usually clears in 2 to 4 weeks; itching stops in 3 to 5 days
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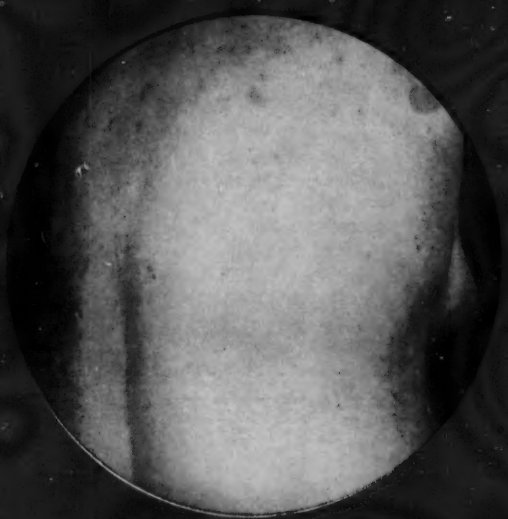
- Oral GRIFULVIN appears to have a very low level of toxicity

Literature on details of administration and dosage is available upon request.

Supplied: 250 mg. scored, aquamarine tablets, imprinted McNEIL, bottles of 16 and 100.

(1) Blank, H., and Roth, F. J.: A.M.A. Arch. Dermat. 79:259 (March) 1959. (2) Williams, D. I.; Marten, R. H., and Sarkany, I.: Lancet 2:1212 (Dec. 6) 1958. (3) Goldfarb, N., and Rosenthal, S. A.: Current M. Digest 26:67 (April) 1959. (4) Wrong, N. M.: Canad. M.A.J. 80:656 (April 15) 1959.

Before treatment—tinea of the body of 9 years' duration. Infecting organism, **Trichophyton rubrum.**



After 18 days of treatment with GRIFULVIN. Healing is virtually complete.

Photographs courtesy of Harvey Blank, M.D., Miami, Fla. The patients shown above received GRIFULVIN (griseofulvin, McNEIL)

CONTROL

Foods can provide many minerals needed for control of body functioning . . . as well as for structure of body tissues . . . but special consideration needs to be given to insure that the diet contains enough of certain minerals.

The minimum quantities of foods listed in *A Guide to Good Eating* can provide most of the Recommended Dietary Allowances for

calcium . . . ⅔ from the milk group . . . and ¼ from the other three groups . . . (Consuming a little more milk, cheese, or ice cream will insure intake of the full allowance for calcium) . . .

iron . . . ⅓ from the meat group . . . ¼ from vegetables and fruits . . . and ⅕ from enriched breads and cereals. (Consuming a little more of one or more of the iron-rich foods in these three groups can insure adequate intake of iron.)

Calcium is essential to normal blood clotting, muscle contraction, nerve functioning and cell permeability . . . in addition to its main role in the growth and maintenance of bones and teeth. Iron is used in the formation of hemoglobin, the red blood pigment which carries life-giving oxygen from the lungs to body cells. Phosphorus . . . which plays a vital part in the energy metabolism of the cells as well as in the formation of bony tissues . . . is provided by foods in all four groups . . . especially those which supply calcium and protein. Potassium, sodium and chlorine are involved with maintaining water balance in the body. Potassium is abundant in animal and plant foods . . . sodium and chlorine are present in foods and table salt. Copper, cobalt, magnesium, manganese, molybdenum and zinc take part in various enzyme reactions . . . and are supplied in needed amounts by foods listed in the "Guide."

Iodine . . . part of the thyroid hormone affecting rate of metabolism in all body cells . . . is easily obtained from iodized salt used for seasoning.

Fluorine . . . not demonstrated to be a dietary essential . . . but shown to give developing teeth substantial protection from dental caries . . . is present in many foods and natural and treated waters.

When combined in well-prepared meals, foods selected from each of those four food groups and seasoned with iodized salt can provide all needed minerals . . . while satisfying the tastes, appetites and other nutrient needs of all members of the family...young and old.

USE DAILY

A GUIDE TO GOOD EATING

DAIRY FOODS
3 to 4 glasses milk—children
4 or more glasses—teenagers
2 or more glasses—adults
Cheese, ice cream and other milk-made foods can supply part of the milk

MEAT GROUP
2 or more servings
Meats, fish, poultry, eggs, or cheeses—with dry beans, peas, nuts as alternates

VEGETABLES AND FRUITS
4 or more servings
Include dark green or yellow vegetables, citrus fruit or tomatoes

BREADS AND CEREALS
4 or more servings
Enriched or whole-grain
Added milk improves nutritional values

The nutritional statements made in this advertisement have been reviewed by the Council on Foods and Nutrition of the American Medical Association and found consistent with current authoritative medical opinion.

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PREDNAMIN™ tablets "potentiated prednisone"

breaks the "side-effects barrier" to full, long-range corticosteroid benefits

PREDNAMIN brought excellent or good relief to 76% of 50 asthmatic patients . . . all of whom had responded unsatisfactorily to one or more years of specific therapy and to epinephrine, ephedrine and aminophylline. Although treatment was prolonged and continuous, only 2 patients required withdrawal of PREDNAMIN because of side effects.*

The optimally balanced PREDNAMIN combination magnifies the efficacy of small doses of prednisone . . . but leaves corticosteroid hazards at a low-dose minimum. With PREDNAMIN, problem asthmatics and patients with atopic and contact dermatoses need no longer be deprived of continuing and often dramatic corticosteroid benefits.

Each PREDNAMIN Tablet contains prednisone 2.5 mg., chlorprophenpyridamine maleate 2.0 mg., and ascorbic acid 250.0 mg. Bottles of 30 and 100.

*Swartz, H.: To be published.

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Darvon Compound obviates the need for a narcotic prescription.

Usual dosage for Darvon Compound is 1 or 2 Pulvules three or four times daily.

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IMS

MAN VERSUS ENVIRONMENT

Man's relation to his environment is changing precipitately, especially in terms of the complex problems of public health resulting from new developments in science and technology. The Conference on "Man Versus Environment" was designed to focus attention on the status of these problems in the major fields of water supply, water pollution, air pollution, food technology and occupational health. It was the purpose of the Conference to evaluate the interrelationships of new developments, to survey the status of research and training needs and to determine areas in which activities should be initiated or expanded.

This feature issue, "Man Versus Environment," consists of a condensation of the full Proceedings (January, 1959) of a conference staged in Washington. The extent of condensation is limited only to the omission of some outstanding contributions highly pertinent to the conference but manifestly less pertinent to occupational health. The Office of the Surgeon of the Public Health Service has released these conference records to this journal for first publication in a periodical.

The Man Versus Environment Conference was sponsored by the National Institutes of Health and Bureau of State Services of the U. S. Public Health Service.

The Public Health Service provided guidance through representatives of the following: Office of the Surgeon General, National Institutes of Health, Bureau of State Services, Division of Sanitary Engineering Services and Division of Special Health Services.

Staff assistance in conference arrangements was provided by Mr. Irving Gerring (National Institutes of Health), Dr. Wilton J. Fisher (Division of Special Health Services) and Mr. Harry Faber (Division of Sanitary Engineering Services). —THE EDITORS

INTRODUCTORY STATEMENT

• HENRY F. VAUGHAN
Dean, School of Public Health
University of Michigan
Ann Arbor, Michigan

Much has been said of late about the changing vistas in public health practice. Throughout the country, both by scientific meetings of professional associations and by the lay press, emphasis has been placed upon three items: (1) the relative diminution in the incidence of the communicable diseases, (2) the marked increase in morbidity and mortality attributed to the chronic diseases, and (3) the disabilities of an ageing population. Less has been said about the changing problems and characteristics in the environmental health program.

Man has long struggled with the environment in which he has chosen to abide, and with the interrelationships between himself and his fellow man.

Gordon in a recent discussion of "Man as an Organism" offers the pertinent statement that "The chief feature which distinguishes man

from other animals is an ability to reason, and through his intelligence determine what he does to himself and to his environment. An unusual flexibility in adaptation also contributes, although in public health it seems to take three kinds of workers for reasonable accomplishment: the physician to adapt man to his environment, the engineer to adapt the environment to man, and the social scientist to adapt men to each other."

I am sure that Gordon may well have added the concept that no one of these three kinds of workers can function effectively in self-isolation. It requires teamwork, since there is no distinguishing dividing line between the responsibilities and the interplay of each. It is the purpose of this conference to provide a forum through which there may be a pooling of viewpoints, focusing upon our desire to serve those who are most concerned with scientific advances in the environmental health field.

From our viewpoint there is need for greater concentration upon research in the area of Sanitary Engineering and Occupational Health, and this can be promoted and accomplished through a realistic cooperation between healthmen, industry and the public. The viewpoint of each is well represented in this Conference. We may do our share through this discussional in placing the solution of environmental health problems in a dynamic position compatible with the national economy and growing population.

Man's struggle for survival dictated early attention to his inanimate surroundings. The first promising advances in the control of disease pertained largely to the field of sanitation and cleanliness. The application of the recognized principles of sanitary science provided a noteworthy contribution to an improvement in water supplies, waste disposal and the elimination of conditions and practices which were offensive to smell and frequently inimical to health.

Progress Brings New Problems

We find ourselves, however, in an ever-changing situation. The new products of industry, the movement of population, an expanding economy, a changing geography involving new atmospheric contacts, together with social changes, are factors which dictate the conditions under which man lives. Each of these factors and many others have a direct bearing upon our way of life. Some are old problems with new facets. Besides this there is a growing quota of problems, including those of radiobiology and the use of atomic energy, which remain largely unexplored and where the impact upon health and the survival of man remains to be determined.

Man has always employed water and air as a means through which to secure his wants and in part to dispose of his own accumulated wastes. The struggle for the use of these natural resources is becoming intensive. The demands for water come as a drinking resource; as a raw material in industrial processing; as an avenue of waste disposal, both from municipalities and industry; as a commercial fishery resource; as a source of recreation and the promotion of wildlife; as a water power resource and to meet the necessities of agriculture. Thus man's struggle is flavored by the natural elements of nature, such as flood and drought.

New adventures in industry, such as the increasing employment of synthetic chemicals, development and utilization of petrochemicals and the accelerated development of local nuclear energy sources, all keep the picture of the problems of water resources and waste disposal in a state of flux.

Changes are taking place which are entirely beyond the control of the traditional healthman. They are stimulated by the newer knowledge emanating from the centers of learning and from educational and industrial research, and production. It is within this framework that we welcome your discussions, with the expectation that they will be provocative in guiding toward new studies in Sanitary Engineering and Occupational Health which are broadly conceived and not limited to the provincial viewpoints of the Study Section members who gather periodically to examine the applications for research grants. We wish participation from all who are sincerely concerned with the trends in an ever-changing way of life which have their impact upon man and his environment and the relationship between men.

Many specific examples of the problems dealing with air pollution, foods, occupations and other areas which have a definite bearing upon the survival of man in his chosen environment, could be cited. But the enlargement of this discussion, as to what should and what can be done will be left in abler hands. With this in view, the Study Section has chosen Dr. Kehoe to enlarge upon the theme. He will be followed by a group of nine speakers chosen because of their special interest in each of the five subjects which are a part of this conference.

HUMAN HEALTH and the *Modern* ENVIRONMENT

• ROBERT A. KEHOE, M.D.
Director, Department of Preventive Medicine
and Industrial Health
University of Cincinnati
Cincinnati, Ohio

The technology of our time has created a wealth of materials and made available the forces of nature for man's use, but it has failed to bring to these materials and forces the understanding of their biological effects that will keep them under control.

This conference is concerned with the threats to the health and well-being of man that lurk in his present environment and, specifically, in environmental conditions which, in some important sense, are peculiar to or characteristic of this period in the life of this nation. This is not to say that we have no concern for the larger society of mankind, or that various aspects of these discussions will not impinge upon a much wider segment of human life and experience than that represented in the United States of America. The attempt, however, is to come to grips with certain practical problems that have arisen among us, and to consider the steps which should be taken by those who bear professional or official responsibility for the health and safety of our people now and in the immediate future.

Clearly the health of a nation or a society involves much more than understanding and control of environmental factors of physical and chemical types, and there is some reason at this time for suspecting that the mental and emotional stress of our time may be its most significant feature in relation to the national health. Certainly the national and international climate, with its alarms and excursions, its uncertainties, and its potentialities for imposing sudden and perhaps disastrous social, political and economic consequences upon large segments of our population, is not conducive to ease of mind. Anxiety, apprehension and insecurity are exhibited all around us constantly, not so strikingly, to be sure, as the strident voices of the press and the radio would seem to indicate, but to such an extent, nevertheless, as to be readily apparent. Perhaps the ultimate response to this may be the toughening of our mental and moral fiber. If so, the signs which point to the opposite response are sporadic rather than general, and are to be fleeting rather than abiding.

Be these imponderables as they may, and be our methods of dealing with them as uncertain for some time to come as they now are and have been in the past, there are tasks before us which are within our understanding and competence, tangible threats to human life itself that we can counter, existing information which can and should be applied without further delay, and further knowledge to be gained by methods of investigation that are now available. The situation calls for prompt action for the avoidance of serious and widespread consequences. There is a great need, also, for more sensitive and more effective methods and tools for research, but this is no reason for not employing those we have, thereby developing facts and skills that will open up new avenues and methods of approach.

It is not necessary to study vital statistics in order to perceive some of the more glaring hazards of modern urban, or for that matter, rural, life. The severity of these hazards cannot be viewed in their proper proportions without quantitative information, but many departures from an earlier way of life have occurred within one or two generations, and thus the vital statistics of an earlier time, as well as the mechanisms

for their collection, are hopelessly inadequate and even archaic. We are aware, however, of a heavy toll of deaths and injuries sustained on the highways and in the homes of the land; of accidental poisonings, especially among children, so numerous as to require regional and local poison centers for the prompt transmission of information and advice; of public apprehension concerning the role of air-borne carcinogenic agents, whether from the partial combustion of petroleum or tobacco, in inducing or contributing to the induction of lung cancer; of heated controversies over the treatment of community water supplies, and the contamination of foodstuffs with insecticides and other foreign substances. And, in a fearsome awe, akin to that imposed by the unknown and unknowable, we contemplate with great uneasiness the dispersion in the air, and the deposition on the land and in the sea, of increasing quantities of radioactive substances. These are the things which are on the horizon of the average citizen.

Looking deeper into the situation with professional eyes, certain other features of the modern environment appear to have graver significance in terms of present and future capacities for harm. Let us sketch two of these in fairly broad strokes.

Occupational Health in an Industrial Society

Through the centuries, man has been called upon frequently to risk his health and even his life, in wresting a living from the land, the sea, the workshop and the mine. But there has never been a time like the present in the history of nations or of men, generally, when man at work has been surrounded by such a multitude of obvious, as well as insidious, dangers to health, limb, organic integrity, and to life itself. Certainly there is a more general and humane concern — a greater fellow feeling — more indeed than ever before, for the health and contentment, as well as the economic status of the laborer. The laborer is also of a very different type than any seen in earlier times. His way of life, in very many respects, differs strikingly from that of previous earners of wages and salaries. Those of our day, especially in our nation, make up the majority of our population. Most of us work for a living, and whether we work with back and arm, or with the observing eye and the trained mind, whether with transport vehicles, earth movers, machine tools, instruments of precision, apparatus for communicating the spoken or written word, or equipment for making calculations at lightning speed, we carry on daily in the midst of a complexity of motion, sound, light effects, equipment, chemicals, and radiant and other forms of energy, that beggars description, and challenges physiological analysis.

Out of this welter of activities come physical and mental wear and tear, physical injuries to sense organs, limbs and integument, and the organic structures of the body as a whole. Death occurs quickly through overt accident, but almost certainly it overtakes many men gradually, reducing their functional efficiency and shortening their lives. Occupational disease kills or disables, at least temporarily, and also takes its toll of life's productive years. By the study of the accidents and illnesses, we learn the cause of injury, disease and death.

But what are the consequences, through the working lifetime, of the frequent, almost daily, impacts of individual and collective insults of minor or subclinical severity? Those with more complacency than curiosity, with more faith in physiological adaptability than can be justified by medical evidence, and with undue comfort derived from crude statistics, will respond to this question with the statement that the people in no previous society have been known to die young in such small numbers, and to live to be old in such large numbers. The easy conclusion from these data is that Americans are healthier now than ever before, and that there can be no very serious threat to health in modern life. But let us look at the facts more thoughtfully and less superficially before we accept this conclusion.

We have reached, if not passed, the zenith of one of the most remarkable and brilliant periods of medical and hygienic history, during which our understanding of infectious diseases was advanced and applied at such a rate that many of the greatest scourges of mankind, in the form of endemic and epidemic diseases, have been almost utterly vanquished. This, the microbiological era of medicine and public health, as it might be called, has wrought a profound change in the practice of medicine, has brought into existence and has cultivated the techniques of preventive medicine, sanitary engineering and public health, and has made revolutionary changes in the statistics of human morbidity and mortality. The diseases in this category have occupied the time and attention of the medical practitioner, investigator and educator, alike, for more than half a century, almost to the exclusion of others. Only in recent years, under the compulsion of the changed frequencies of the causes of illness and death, has attention begun to shift, proportionately, to chronic degenerative diseases and those of the ageing segment of our population.

Meanwhile, the environment of the living, working population of the country has been changing, and the appreciably subdued microbio-

logical threats to human life and health have been replaced by the inanimate threat of the machines and materials which inventive man has made, and by the forms of energy with which he has surrounded himself. The physical basis of modern industry is something new under the sun — an environment made by man which, in the making, has taken so much of his total time, effort, thought and ingenuity as to leave very little for expenditure on learning what might be its ultimate effects upon himself.

As might be expected, the most strategic site for the examination of the industrial environment and of its impact upon man, is within industry itself. Until recently, however, the medical and sanitary sciences have been represented but scantily among the personnel and facilities of industry, and the great proportion of American industrial organizations, especially the preponderant, small units, have operated almost entirely without benefit of preventive medicine and industrial hygiene. Moreover, medical and hygienic research has explored only the surface of the industrial environment; educators in medicine and sanitation have failed, for the most part, to recognize, much less to keep pace with, its existing hygienic problems. While we wait to muster our forces, and to deploy them in greater numbers and in a more effective manner, these problems grow in number and variety.

Only a minute proportion of our industrial organizations have valid medical information concerning the hygienic status of their employees, while the composite picture of the state of health of our general industrial population does not exist even in rough outline. Not only is the incidence of occupational disease unknown, because of the lack of suitable mechanisms for reporting and assembling information that comes to light, but great areas of industry are not under such observation as would provide such information. It is by no means certain, therefore, that the harmful effects of the composite hazards of industry have not exerted important and widespread effects upon the national health, which, because of the brilliant results of our efforts in the field of microbiological prophylaxis and therapy, may have been masked in our gross statistics of morbidity and mortality.

These comments are not made to incite apprehension, or to point the finger of accusation at any commercial, political or professional group, for indeed it is not likely that the national health has suffered disastrously or irreversibly up to the present time, and if it has been affected significantly, we are all at fault for our lack of vision and our preoccupation. Their point, however, is that we do not know, and we have no present means of knowing, just what has resulted from the profound changes wrought in the industrial environment by modern technology. As these changes progress in their complexity, how are we to know where they are taking us, hygienically speaking, unless we examine them closely, develop methods for their qualitative and quantitative appraisal, and equip ourselves to understand and control their effects? We are, indeed, becoming concerned about ionizing radiation, which has been far better studied and controlled, thus far, than almost any other newly exploited technologic development. Why are we not more deeply concerned about what has been happening to us, largely unobserved and with little anticipatory investigation, during the last half century, within which the environment of the day's work has been revolutionized?

We have been devoting large expenditures, magnificent facilities and the best brains of the country, in increasing numbers and proportions, to the development of new technologic departures from our previous handiwork. Why can we not devote an adequate proportion of the financial and intellectual resources of the country to the guidance of modern industrial technology in the ways of human safety and health? The time has come when we must carry out physiologic and hygienic research hand in hand with technologic research, and when we must develop the methods and techniques of industrial hygiene stepwise with the technology of production. True, this is being done, but only in token. Neither industrial management nor its hygienic advisors can be credited, generally, with a sound grasp of the situation or with plans for handling it.

Public Health in an Industrial Society

If we are concerned about our industrial population, we have cause also for concern about our population generally, for the industrial environment has become, to a remarkable extent, the national environment. We have called attention to this elsewhere, in commenting on the extent to which the problems of modern medical practice have their origin in industry. The "streets, highways, railways and airways (of the country) are hazardous because of the machinery and speed of transportation, and the great variety of the products transported; its homes and farms are dangerous because of many of the same factors that create industrial hazards — the number and variety of machines, the sources of power, the fuels and refrigerants, the drugs and chemicals that serve agriculture and the modern household; its streams, which are often its general water supplies, are polluted with common sewage, but also with all of the nonvolatile substances that comprise the raw, intermediate and finished (chemical) products of

industry; its food contains a host of natural substances of which the earth is composed, and variable quantities, as well, of scores of additives, contaminants and chemical substances derived from the modern use of fertilizers and insecticides, or from the multiplicity of materials employed in processing and packaging our foods; the air of its towns and cities, and often that of its open country side, is burdened with the smoke of dwellings and other buildings, of transportation equipment and of factories, and also with some portion of almost all of modern materials and chemicals, as these are released from the vents and stacks of industry. This new and dangerous environment, which man has created for himself, now provides the challenge to both curative and preventive medicine — a challenge that requires additional types of medical knowledge, new medical skills, and new settings for the application of such knowledge and skill." Let us examine more closely but one feature of this situation, with the idea of indicating some of the methods of investigation that will find application within the general field.

Some hundreds of new chemicals find new uses in American industry annually. These may be new plastics, plasticizers, or additives to alloys, fuels or foods; they may be pesticides, preservatives, solvents, detergents, adhesives or abrasives; or they may be part of the composition of fabrics used for clothing, household draperies and kitchen equipment. Many of these materials come into intimate contact with the people of the nation in their places of work, in their conveyances to and from work, and in their homes. Many of them enter directly into the food of the land, and many others find their way indirectly into the food, the water supply and the atmosphere. In these and other ways these chemicals find their way into the midst of the already complicated chemical reaction mass of the human body.

In speaking of the chemistry of life, one is aware of certain complexities which have been revealed only partially and superficially by biochemical and physiological research. Man is composed in some part of the elements and substances that enter into the composition of the earth. The contributions made by certain mineral elements alone to the mechanisms of life have been investigated at length, but our general knowledge is but fragmentary and often fortuitous. Nevertheless, we endure our ignorance with a certain philosophical equanimity in recognition of the fact that the composition of the earth and the composition of man exist in an intimate historical and biological relationship which is inevitable and not of our making. But what can one think of the artificial situation, in which many new materials, possessed of many, almost an infinity of, possibilities for metabolic modification within the body of man, find their way into it, for better or worse. We shall never be able to anticipate and visualize the harmful potentialities of new materials until we achieve a comprehensive understanding of the role of the normal elements and other components of the living organism. Only on such a comprehensive background can we discover, fairly promptly, the metabolic deviations, if any, induced by new chemicals.

This brings us to consider the foregoing problem from a somewhat different viewpoint. No principle of biology is clearer than that which relates a physiologic response to a quantity of stimulus within appropriate limits of time. The living organism is resistant in varying degrees to varying stimuli, and the stimulus must be adequate to induce a response. It is this principle on which we base the differentiation of harmful versus harmless stimuli in terms of dosage and time. Toxicity, in these terms, does not relate to a specific substance but to a concentration of that substance arrived at within certain limits of time in the effective tissue or chemical system within an organism. A toxic environment, by the same token, is one which, again within certain limits of time, introduces into the organism a harmful quantity of a substance. The means by which this is done may be single or multiple — that is the medium may be the atmosphere, water or food, or any combination of these. The multiple environmental sources of human exposure to chemicals provide a good illustration of the complexities of the problem of public safety. Let us look at such a situation as it relates to a mineral constituent of the earth.

A mineral taken from the earth and brought into commercial use, may pose certain problems of industrial health, from the aspect of the toxicity of one or more of its ingredients. Measures of control can be provided on the basis of certain toxicologic facts, and certain products can be made available in the desired form or forms of commerce, without undue industrial hazard. In the process, constituents of the mineral have been discharged into the air around the production factory. These settle out on the land, thereby increasing its content of the mineral in question. Vegetation which grows out of such soil may take up the mineral from the soil, and the mineral may also be deposited upon the vegetation, which then, if eaten by animals or men, carries more than its natural content of such minerals into their bodies. Such domestic animals and animal products, used as human food, contribute to the total intake of the mineral by man.

At the same time, water-borne waste from the factory is conveyed away in pipes or ditches. This pollutes a stream nearby and affects an entire drainage area to an extent which may be only theoretical on the one hand, or highly significant on the other.

This process, in one form or another, may be multiplied in many or all parts of a country, so that a mineral constituent brought forth out of the earth comes to be spread far and wide in the air, in the water and in the food materials of animals and men over a continent, or even over the world. This same process, multiplied still further by the industry, agriculture and the other activities of a country, may so change the balance of nature, with respect to the numbers of the normal constituents of the earth and their proportional representation in the soil, water and atmosphere of the country, as to alter the mineral metabolism of mankind in the area concerned.

The illustration which we have chosen is only one of many that could be taken to follow the course of technologic man in his efforts to make use of the materials of the earth for his own purposes, to wrest from nature secrets that will feed, clothe and house her growing population, that will transport him with ever increasing speed to the four corners of the earth and beyond, and release energy from natural sources and direct it to carry out his bidding. In doing these many things, as has been pointed out elsewhere in great detail, man has changed and is changing further the face of the earth, has altered and is further disturbing the conditions under which life on this planet came into existence and has persisted, with changes and differentiation, for some millions of years. It seems likely that man's activities in strictly modern times, as represented in his technologic applications of the natural sciences, have brought about greater environmental changes of more profound physiological significance than have all the generations of men heretofore. During the greater part of historical times man has been contending with natural forces and natural threats to his survival. He has now moved into a period in which his knowledge and power have enabled him to modify the very conditions of his life. The time has come, however, when a much greater and more comprehensive knowledge of the consequences of our changed and changing environment must be had for our safety — perhaps for our very survival.

The efforts made to obtain the necessities of life and then to seek comfort, wealth and power have occupied most of the men of our time and every other time. The men of all ages, who have sought by the methods of their time to cultivate and protect the health of the people, have been few and their resources relatively small. The technology of our time has created a wealth of materials and made available the forces of nature for man's use. At the same time it has failed to bring to these materials and forces the understanding of their biological effects that will keep them under adequate control. The effort must be made to reduce the gap between technology and biology before it is too late. This will take time, studious effort and money: time for the training of experts in the various fields of medicine, hygiene and sanitation; studious effort to ferret out the problems most in need of investigation; money to initiate and catalyze the investigations without which we shall remain in relative ignorance.

It must become an axiom of modern chemical and technologic research that the materials produced and the forms of energy harnessed must be as well understood for their biological potentialities as for their physical and mechanical properties. It is equally important that other man-made factors in the human environment, including those which we cannot foresee at this time, should be examined critically for their harmful potentialities, in the full recognition of certain facts of life and death, which have recently come upon some of us with a shock. It is clear that reckless man can turn loose and build up physical forces which may destroy himself and his kind. It seems probable, however, that the same ingenuity which thus far has enabled him to penetrate other secrets of nature will serve his need when expended in learning more of his own vulnerability and in developing the means for self-protection.

Research Problems in Air Pollution

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A discussion on the extent of air pollution, its specific areas of research needs, its definition and allowable limits, and on means of control.

Aside from public concern with the subject, the field of air pollution is a common meeting ground of such diverse professional interests as the physical and biological sciences, engineering, public health, economics and the law. In one way or another these disciplines are concerned with man's environment — the changes that take place or are caused to take place in it, the effects of these changes and rules that may accelerate, delay or prevent such changes. Research and technology may embrace the complex and systematic approach to a Los Angeles smog problem or radioactive fallout; or may involve a less sophisticated elucidation, which I am assured is nevertheless the subject of a doctoral dissertation on file in the library of one of our learned universities the effect of the prevailing winds on the location of pig pens in Will County, Illinois.

The explosion of world population, the expansion of communities and the growth of industry are accompanied by increases of air-borne wastes, new kinds of pollution or well known contamination released in new places. In this country and abroad, widespread rebuilding of blighted or war devastated areas of cities has placed emphasis on air cleanliness as one of the good things of life. Better scientific information and better control equipment are bringing cleaner air nearer to realization.

In any air pollution situation the first requirement is to know what standards of air cleanliness are to be maintained. Why is it necessary or desirable to maintain these standards — for health reasons or to eliminate a nuisance? If smoke is the problem, is a change in the type of fuel necessary and what will it cost? If hydrocarbons and the oxides of nitrogen are responsible for eye irritation, crop damage and limited visibility, what are the effective concentrations and what are the feasible steps available to change the underlying chemical reactions? Are grab samples adequate for evaluation, or must there be instantaneous and continuous records? Are instruments available for measuring or must they be developed and standardized? If automobile and diesel exhausts are a significant cause of air pollution, whose responsibility is it to develop the control equipment, how much will it cost and when and where is it to be required?

The Effects of Air Pollution

Lack of scientific evidence that air pollution is injurious to health except in dramatic instances is not a satisfactory answer to those living in polluted atmospheres. While a health hazard need not be demonstrated to establish the need for air pollution control, the relation between air pollution and chronic disease must be found.

It has been said that "the role of air pollution on the health of a community[1] is so involved that the job of answering it seems almost insurmountable. Even from the standpoint of a relatively severe short-time exposure the answers do not come easily . . . Bearing in mind

the difficulties in studying these effects of a severe short-time occurrence it is impossible to visualize the problem of evaluating the more nebulous effects of long-time exposure to much smaller amounts of contamination. In the latter case, one has much more opportunity to study the contamination itself . . .

"An answer to the question of the relation between air pollution and chronic disease must be found because of the many indications that a polluted atmosphere is not conducive to the best of health . . . It is obvious that a determination of the role of atmospheric pollution in affecting the general health of a population is going to require a tremendous amount of painstaking and costly research over a long period of time."

The economic effects of air pollution are more readily appraised than are health effects, and the response of animals and plants to certain contaminants can be observed and measured. The deleterious effects of air pollution on fabrics, metals and buildings represent a significant loss in every metropolitan area, and need a more careful study than has been done heretofore. There is growing concern in some congested areas about the effects of air pollution on the operation of airplanes and ground transportation.

The Extent of Air Pollution

Topographic and meteorological factors are important in any scheme of air pollution control. If cities could be planned with this in mind there would be less objectionable air contamination but this is rarely possible. Favorable weather conditions may permit the release of air pollutants in one area which cannot be tolerated under less favorable conditions in another place. Topography has an important bearing on whether wastes discharged to the atmosphere will accumulate in objectionable quantities. Valleys crowded with industrial activity are noted for their smogs and were it not for the advantages of transportation and water supply, they would be avoided as industrial sites. Perhaps the opportunity for avoiding the damaging effects of air pollution on metropolitan development should be the subject of a study directed to the attention to land use specialists and planning groups.

Air pollution does not respect political boundaries, and the enactment of statutes, rules, regulations and codes by a metropolis are of no effect if the air contaminants of a neighboring community, borne by the vagaries of the wind, or confined by topographical and meteorological conditions are deployed over an otherwise regulated community. It has become increasingly evident that the control and abatement of air pollution is not a narrow local problem, but one which calls for county-wide, statewide or interstate regulation and cooperation.

The states of California, Delaware, Florida, Kentucky, Massachusetts, New Jersey, New York, Oregon and Washington have enacted legislation seeking to control air pollution. Regulations promulgated under such legislation place the emphasis on using fuels efficiently so as to avoid the production of smoke and fumes, and on the prevention of the emission of solids, gases, liquids and vapors by requiring that equipment designed to accomplish this be installed and operated efficiently, rather than by purely punitive measures or the imposition of fines. The elimination of the causes of air contamination rather than the abatement of a nuisance appears to be the goal of present day legislation.

The Limits of Air Pollution

In Los Angeles[2] a medical and scientific group recommended allowable concentrations for a small number of specific compounds in the community atmosphere. Limits were established for oxides of nitrogen, ozone, sulfur dioxide and carbon monoxide. These limits in parts per million of air were adopted and have been in force since 1955. The warning level has been reached by ozone and approached by the oxides of nitrogen during heavy smogs.

This is not the first attempt to set limits for air pollution, however. Swain,[3] in 1910, suggested an hourly average of one p.p.m. for sulfur dioxide at the ground as the maximum permissible discharge for smelters in farming areas. About 20 years ago, the Trail smelter[4] set up an operating regime to prevent SO_2 damage to crops in the Columbia River Valley.

The oldest and best known effort to apply an objective measurement to air pollution was made by Maximilan Ringelmann[5] about the turn of the century. The chart which bears his name was introduced into the United States in 1908 and is the basis of smoke evaluation in many ordinances in this country. It has served very well as a reference for establishing smoke density or training individuals in the observation of black smoke.

These examples represent some of the attempts at exact definition of air pollution. In fact, the Los Angeles maximum allowables are admittedly experimental and the Ringelmann chart has its limitations. Like many other facets of air pollution, if definition were easy it would have been agreed upon long before now. As research progresses, there will be more exact standards of air purity but at present it is defined with considerable variety and some trepidation.

Specific Areas of Research Needs

The Public Health Service, the Los Angeles County Air Pollution Control District, and other organizations have made intensive surveys of pollution and the associated meteorological conditions. The point has not been reached, however, where it is possible to extrapolate the detailed conclusions to other cities. The numerous micrometeorological and microclimatological surveys made for other purposes, if available, would be extremely useful in evaluating the diffusion of effluents in many cities. Again the question arises whether the policy of secrecy or overclassification of scientific information is in our best interest.

More information is needed on the factors affecting air movement in different types of localities and on the interaction and fate of pollutants, especially at times of temperature inversion and fog when the concentration of pollutants is likely to be greatest. It is important that there be a thorough study of local meteorological conditions in planning for the abatement of pollution and for its prevention in the planning of new industrial and community development. As population grows, communities and industry must grow to meet people's needs. A satisfactory solution to the air pollution is not in the denial of space for growth but in informed site selection and effective control of air-borne wastes at the source.

Typical programs, instruments and procedures should be developed for communities of varying size and budget who are setting up air pollution programs. Much can be accomplished in the reduction of air pollution using simple instruments and methods for the measurement of dustfall, smoke and the common gaseous contaminants.

Data should continue to be developed on the subject of maximum allowable concentration of pollutants in the ambient air.

Morbidity and mortality rate studies for chronic bronchitis and primary lung cancer need to be made where information on the significant variables is available.

Many complex air pollution problems now come before the courts for resolution. There is need for study and research by the legal profession of the means of presenting the scientific facts to the jurist.

Public Law 159, 84th Congress (July 14, 1955) authorizes the Surgeon General of the Public Health Service to recommend and conduct research, studies and investigations to reduce or eliminate air pollution, in cooperation with other federal agencies, states and local governments, air pollution control agencies and other public and private agencies. Enforcement is the responsibility of the states and local communities.

The problem of air pollution arising within one state and crossing its boundaries of a neighboring state are properly subjects for interstate agreement by compact between two or more contracting states.

The recent state statutes generally provide for research in the field of air pollution control, for dissemination to the general public, enforcement authorities, and public and private agencies, information and knowledge gained from such research, and for the use of conference, conciliation and persuasion to eliminate the sources or causes of air pollution prior to exercise of the police power to achieve that purpose.

The authority of municipalities to enforce local statutes designed to abate smoke pollution as a nuisance, and the constitutionality of such statutes have been upheld by the courts on numerous occasions where the application of such statutes and the regulations promulgated thereunder have been reasonable.

It may be concluded that the legal pattern for air pollution control has been set and that research will be accomplished and coordinated in the field of public health.

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Future Problems in Air Pollution Research

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The air pollution problem of the remote future, in common with other problems of living together, will have to find its solution in some form of population control. Perhaps we will have the courage and perspicacity to tackle the job before it is too late. If not, nature has a habit of imposing her own limiting measures, usually in a manner antithetical to the philosophies of public health.

For a long time to come the exploding population of the earth will be forced to find means of adaptation to the planetary environment — in spite of projected excursions into outer space. Perhaps the science fiction dreams of colonization in other parts of the galaxy will be realized some day in the distant future, but for all of us and our children's children there will be only the large but certainly not infinite global resources of earth, air, water and fire to divide among the growing numbers of coinhabitants, to use, and to conserve.

Of these four "elements" of the ancient mystics it has been easy to recognize the limitations in mineral resources taken from the earth, and of water supplies pure enough for human use. When the impending insufficiency of fresh water became apparent we were forced to recognize the need to tap energy sources such as the atom and the sun to supplement the vanishing fossil fuels. But the air we breathe, presumably because of the illusion of boundless volume afforded by its transparency, is still difficult to consider as a resource which can be exhausted or rendered unpleasant to live in by the very acts of living. Only recently have a few communities experienced difficulty in adapting themselves to the volumes of air available to them under occasional circumstances of limited wind movement.

In two or three cases the communal quota of air has been so filled by the products of municipal catabolism that it has killed. In a small number of other areas, as in Los Angeles, the pollution has caused chronic recurrences of personal discomfort, has limited agricultural production of foodstuffs, and has violated aesthetic sensibilities.

Such events have been, and of course are, of great importance to the affected communities; but they have much greater significance as advance predictors of things to come in these and other metropolitan areas if no action be taken to avoid overuse of the air supplies during periods of minimal flow. What has affected Los Angeles and a few other cities in recent years will almost certainly produce similar difficulties in many other cities at some stage in metropolitan growth. In this sense, at least, the problems still unsolved in these places will continue to be the research objectives for some time in the immediate future. In other words it can be anticipated that necessity will force the unsolved problems of the present to pattern air pollution research in this country next year and the next, and to a diminishing degree (proportional to the annual effort) through the following decade or more.

This assumption makes the task of defining

areas of needed information relatively simple. The following tabulation of present problems which await future solution is a composite of the convictions of a number of informed people with whom the question posed by this conference has been discussed. It is probably significant that each one suggested essentially the same listing, although there was no general agreement as to the relative importance of the items.

The Chemistry of Air Pollution Systems

While it has been about seven years since establishment by Haagen-Smit and others of the general principle of photochemically induced interactions among primary atmospheric pollutants, the extraordinary complexity of the dynamic photochemical systems affecting Los Angeles and other cities is only now being fully realized.

Substances causing eye irritation, accumulations of ozone, damage to vegetation, and possible physiologic damage in man appear to be labile, transitory constituents of the ever-changing system, and have therefore proved difficult to measure or even identify. Their existence appears to depend on the photochemical formation of free radicals, if indeed certain types of free radicals are not responsible for the observed and suspected effects. Since the existence of free radicals is essentially coterminal with the activating solar energy, capture and analysis apart from the continuously activated system have not been accomplished nor even seriously attempted.

Of course, in existing situations it is possible to recognize the primary reactants involved in the chains of reaction; in Los Angeles the elimination of oxides of nitrogen and of organic vapors. especially the unsaturated compounds, would effectively inhibit the formation of the suspected labile intermediate compounds. But it has proved difficult to ban by fiat, as in the case of incinerator products, either of these two classes of reactants as a whole. It is my opinion that, in the long run, the practicable form for control of such reaction products will prove to consist of a very selective elimination of those species of primary compounds determined to dominate the identified reaction chains. For example, if it turns out that the total loss of hydrocarbons to the atmosphere, from all the widely scattered sources, consists largely of saturated compounds with little or no significance in the reaction, then it would probably be less expensive and more practicable for the community to expend its tax monies and effort on control of the relatively few highly reactive species.

Much difficult and exacting research will have to be done before the essentials of the photochemical mechanisms are sufficiently understood to make such selective control predictably effective.

The Chemistry of Sulfur Compounds

While the importance of SO_2 and SO_3 in the London disaster of 1952 has been inferred, and the role of these products of the combustion of sulfur containing fuels in acute air pollution episodes elsewhere has been suggested often, there is still a considerable area of missing information as to what really happens to sulfur compounds in photochemically activated atmospheric systems. Johnstone and his associates are contributing valuable experimental evidence of the rates of formation SO_3 from SO_2 in the presence of moisture and of catalytic particles, and Amdur has produced evidence of enhancement of SO_2 toxicity by the presence of NaCl aerosols of small average particle size. But there are numerous theoretically possible interactions among SO_2 and the assorted organic and inorganic free radicals believed to form in the polluted air during irradiation. Malodorous and potentially toxic intermediates are possibilities. This group of reactions does not appear to have received very much attention although sulfurous combustion products are usually among the first pollutants suspected in communities feeling the effects of atmospheric contamination.

Physiologic Effects of Aerosols in Atmospheric Reactions

Doctor Amdur's work, referred to above, has drawn sharp attention to the possibility that some species of aerosols influence the toxicity of some kinds of gaseous pollutants. This phenomenon has been suggested previously and in reality is supported by scattered evidence from a number of sources.

Another role of aerosols in the air polluting system has been suggested on theoretical grounds and is receiving experimental support as the result of the work of Calvert and his associates at Ohio State. There is a possibility that specific kinds of air-borne particles act catalytically in the photochemical system to a significant degree. Intervention of such an accelerative process could lead to error in estimates of the over-all oxidative or other reactive capabilities of air-borne mixtures.

Determination of the kinds and degrees of interaction among gases and particles will require skill, new techniques and much high quality work. It could lead to much improved accuracy in the selective control of significant pollution sources.

Physiologic and Toxicologic Effects of Specific Pollutants

It is unfortunately true that very little definitive knowledge of the effects of most of the substances known to be present in the air of our cities is available. Prolonged dosages at low levels of concentration of highly reactive oxidants, free radicals, and condensation products of the photochemical reactions of organic compounds, are strongly suspect in relation to various chronic and acute diseases of the respiratory system among city dwellers. Which, if any, are culpable? At what levels of concentration do they cease to be troublesome over long periods of exposure? Do they produce, or predispose to, carcinomas of the lung and other sites? Does long exposure to any of them at some level of concentration affect longevity, work efficiency, or general well being of men, women, and children? Do any of them specifically or in combination with other circumstances, adversely affect respiratory, or other restrictive systematic impairments?

All of these questions, and many others, need answers to provide bases for general or specific control standards and to give the public the assurance it should have that control actions may reasonably be expected to protect them against dangers presently definable as vague conditional concepts.

Development of Procedures and Instruments for Analysis

Our understanding of atmospheric reactions and their products, effective monitoring of pollutant levels, and making useful pollution surveys, will be limited for a long time in the future by the tools available. We measure and record "oxidants" and "sulfur dioxide," "oxides of nitrogen," "hydrocarbons," and many other significant properties of polluted air by methods which have limited specificity in most cases, and in others (e.g., "hydrocarbons") actually are incapable of estimating many species of the general class.

Furthermore, most of the instrumental methods for monitoring and survey are so costly and complex as to preclude use by any but the most severely affected communities. Instrumentation and analytical methods for air pollution work need to be made inexpensive, simple, direct and specific in principle and in operation.

In at least one area meterologic instrumentation and methodology have proved to be beyond reach of any local jurisdiction: surface weather phenomena can be analyzed effectively, but existing methods for measuring vertical air movements below the inversion base would be too costly to be utilized. It will be essential, in regional zoning plans, that patterns of pollution movement in all three dimensions of the air reservoir be established by new and cheaper methods.

Part of the cost problem related to pollution surveys may be attributable to a tendency to "keep up with the Joneses." It is reasonably suspected that, of the numerous measurements habitually incorporated into air pollution surveys, only a few (perhaps one or two) would give information fully as useful as that obtained by all them together in any given local situation. One of the most pressing immediate needs is the provision of bases for selection of one, two, or three simple, direct indices of pollution in relation to identifiable patterns of pollution source.

Air Pollution Problems for Future Research

The five problem areas certainly could be extended in terms of engineering control of sources of pollution. As technologic changes occur in manufacturing processes, transportation and commerce, a continual procession of new abatement techniques will be demanded and developed. Engineering problems never will be quite solved.

Our review leads naturally into much less certain speculation on what may constitute the major air pollution concerns of the next half century. It is none too soon to look so far ahead since, even in these days of accelerated scientific advance, any change in practices related to the public health seems to require 10 to 30 years of exploration, reconfirmation and public education prior to implementation. On the other hand the pace and inventiveness of modern scientific effort militate against clairvoyance. The following suggestions are predicated on knowledge of a few things taking form at present which seem destined to affect the air supply, or improve our capability for cleansing it.

1. Pollution by Radioactive Materials

There is a considerable body of informed opinion insisting that the air-borne products of nuclear fission and fusion processes are endangering the health of the present and future generations. Nothing foreseeable will prevent the continued exploitation, on an expanding scale, of atomic energy whether for peaceful or military purposes. Therefore it appears inevitable that both local and world wide problems of pollution by radioactive by-products will increase in frequency and intensity.

2. Meteorological Control of Local Air Pollution

Significant strides in the direction of long-range weather prediction have been made during the past 20 years, and some progress to-

ward local modifications of meteorological phenomena has been reported. Our imminent capability for satellite observation of air movements, and the availability of almost unlimited energy from nuclear processes, make it worthwhile to consider modification of regional meteorology as a means of assuring more adequate local air movement. It should not be forgotten, in speculation on such possibilities, that the movements of water in the oceans are often basic factors in weather patterns. In imagination, at least, the detailed oceanographic and meteorologic studies initiated as part of the IGY program, could be of immense usefulness in air pollution control in the future.

3. The Effects of Air Pollution on World Climate

One of the questions on which the IGY program is seeking data relates to the possibility of gradual and recent increases in the concentration of CO_2 in the world's atmosphere. Some evidence has been advanced to the effect that combustion processes are adding CO_2 so rapidly as to cause accumulation in spite of the water reservoirs with which it must be in equilibrium. If this is indeed the case, it is predictable that the rate of increase in CO_2 will accelerate as human activities surge to successively higher levels. A significant change in CO_2 level in the air could, in theory, produce profound effects on world climate. Some form of CO_2 monitoring on a world wide basis might well be continued as a means of determining the time at which air pollution will have become planetary in its effects.

4. Jurisdictional Problems in Air Pollution Control

Many of the foregoing problem areas imply extension of air pollution study and control beyond local, state, and national jurisdictions. Already, in a few regional situations, there has appeared need for the establishment of acceptable procedural and survey patterns which will permit a variety of authorities to act jointly without undue violence to the autonomy of the participants. While preparation for concerted action among affected governmental units does not fall into the scientific research category, it will be essential to the effective application of technologic principles now known and to be developed.

Summary

Those of us engaged in air pollution control activities are generally not encouraged to look too far into the future; the demands of the present take precedence, and the agencies with which we are associated have no capability in law or in precedent to plan actions designed to be effective more than two or three budget years in advance.

Nevertheless, it must be apparent, whenever we do project the developing trends of community sanitation into the future, that the problems we face are increasing in some exponential relationship to national and world populations. Almost all the environmental factors demanding attention are of two sorts: (a) those involving competition for finite amounts of the materials required for human existence, and (b) those resulting from accumulation of by-products of the human utilization of such substances. Thus air, water, and basic nutritional, industrial, transport and energy requirements become the foci of almost all efforts to maintain health, reasonable living standards and some comfort in the face of an exploding population. Sooner or later health agencies will have to face the fact that 600,000,000 people cannot live well in the waste products of resources capable of sustaining half of that number.

Low Ceiling

Air Line Pilots Association disputes the contention of Federal Aviation Agency that there is medical justification for compulsory retirement of fliers at age 60 and denial of certification to fly jet planes if applicant is past age 55. In a 105-page brief commenting on FAA's plan to effect these reforms in interest of safety, ALPA states: there is no medical evidence to support the agency's position, no relationship exists between pilot age and accident frequency, and the proposed rule is arbitrary and outside FAA's authority.

—*Washington Report on the Medical Sciences*, Oct. 5, 1959.

Summary and Discussion

Research Needs in Air Pollution

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The principal topics discussed by the Air Pollution Panel Group can be grouped as follows: (1) specific research needs, and (2) the balance of desirable research effort as between biological (principally health effects), physical science and engineering studies, or the relative priority which should be given to each of these.

There was full acceptance of the necessity of recognizing the limitations of the atmosphere as a natural resource in diluting and dispersing pollutants which will certainly be reached increasingly in many urban areas unless appropriate preventive action is taken. There was agreement also that air pollution research should include consideration of aeroallergens, whether of natural or man-made origin.

With respect specific research needs in the field of air pollution, the Panel endorsed a composite listing made up of the following:

1. The specific suggestions included in the papers presented by Dr. McCabe and Dr. Chambers.

2. A list of categories of research on the effects of air pollutants on human health as presented by Dr. Fisher of the Public Health Service.

3. The listing of needed physical science and engineering research developed at the Research Planning Seminar held at the Sanitary Engineering Center in February, 1958.

Since the second and third items have not been presented to this group heretofore, a brief outline of them may be in order.

The Fisher listing of needed research on the health effects of air pollutants includes the following five categories:

1. Research on long term effects and exposures —embracing both experimental and community studies.

2. Research on toxicological and physiological effects of pollutants, both acute and chronic.

3. Evaluations of respiratory disease, in general and in particular, in relation to air pollution exposures.

4. Evaluation of the effects of exposure to total composite community air pollution (including the effects from sub-total composite pollution such as from auto exhausts).

5. Development of improved techniques for community assessment of health effects through epidemiological studies.

It was agreed that any positive findings in community epidemiological studies would require in follow-up more precise focusing of attention on specific pollutants for pin-pointing of cause and effect relationships.

At the Research Planning Seminar at the SEC in February of this year, six committees developed relatively detailed categories of air pollution research needs. The respective committees concerned themselves with: aerosols, chemistry, meteorology, instrumentation, agricultural effects and engineering. The Committees made no effort to establish priorities.

I. The Committee on Aerosols. It recommended two general categories of research:

(a) Those areas directed at understanding the system to be controlled. This category included:

1. Study of the formation, growth and fate of aerosols. (Evidence indicates relationships between formative process of certain types of particulates and irritative and other nuisance properties in polluted atmospheres.)

2. Reactions between particles and gaseous pollutants. (Much remains to be elucidated as to the dynamic equilibria in systems as affected by physical and chemical parameters.)

3. Characterization of aerosol particles with respect to composition, energy state and other parameters.

4. Sensitization of reactions at the interface between particle and gas.

5. Relation of particles and their processes of formation and growth to biological irritation, plant damage, and other effects of pollution.

(b) Research needs for immediate application in control:

1. Collection and collation of data as to size, physical and chemical properties of particles from various pollution sources.

2. Collection of data to establish patterns of variation in distribution of aerosols in relation to various sources.

3. Development of specific measurement and analytical techniques and instrumentation.

4. Correlation of visibility with atmospheric aerosol content.

5. Source control of aerosols.

II. The Chemical Committee. This committee's considerations were essentially limited to problems of sampling and analysis:

(a) On sampling, the principal emphasis was on gaseous contaminants, with recommendations for further study of methods using absorption by scrubbers, etc., adsorption and freeze-out.

(b) On analytical procedures, it suggested further study and development of a wide variety of procedures was recommended — gas and liquid chromatography, infra-red and mass spectrometry, polarography, microwave spectrometry, bioassay procedures and others.

III. The Meteorology Committee. It considered one problem of prime importance — the quantitative specification of atmospheric dispersal capacity. Three categories of needed research were listed:

1. Meteorological aspects of specific community studies (dilution, zoning, sampling, locations, etc.)

2. Meteorological research directly appliable to community air pollution. Principal recommendation in this area was for a comprehensive study of the intermediate and large scale processes (0 to 50 miles) involved in the 3-dimensional transport and dispersal of contaminants.

3. Basic research on such subjects as atmospheric turbulence, microclimatology, and meteorological measurements to extend the scientific basis for more immediately practical studies. The Committee devoted attention also to specific needs for instrumentation for various purposes, the use of tracer materials, use of models, and other accessory research needs.

IV. The Instrumentation Committee. Its recommendations can be summarized very briefly: Instruments are most needed for:

1. Gas phase pollutants — at sources in the free atmosphere, and in the laboratory.

2. Aerosols — again at sources in the free atmosphere, and in the laboratory.

3. Visibility in the atmosphere.

V. The Agriculture Committee. Its basic recommendation was for expansion (or initiation) of fundamental research on the effects of practically encountered concentrations of pollutants and of mixtures on plants and animals.

VI. The Engineering Committee. This committee made a plea for more support of basic research, voicing dissatisfaction with progress and pointing out that current air pollution research expenditures amount to about 0.1% of the estimated economic burden of air pollution to the nation.

It recommended first consideration for control by process design or modification. In other instances it recommended acceleration of research for control procedures on a variety of pollutional discharges — from pyrometallurgical processes, internal combustion engines, steam generating facilities, incinerators, etc.

Largely for evaluation purposes, it recommended emphasis on several other categories of research, such as collection and collation of data on the quantities and characteristics of atmospheric pollutants; the deposition and retention of pollutants on surfaces; the development of improved control evaluation techniques, involving reliable solid and liquid test aerosols, and improved subjective measurements for such parameters as eye irritation and odors.

In the discussion by the Panel on the relative emphasis to be given to health effects, physical science and engineering studies respectively, no decision was reached as to relative priority between these categories. One participant received support in the viewpoint that research on health effects should have top priority, at least in work supported by PHS funds. However, the consensus appeared to be that research is needed in all categories and that available resources should be channeled to specific projects on the basis of urgency of need and expected productivity, without being bound by rigid priorities by category.

No specific "resolutions" or "recommendations" were adopted by the Panel other than those which are implicit in the suggestions for needed research, including the support required to carry it on.

DISCUSSION OF REPORTS

LESLIE A. CHAMBERS: There is one area in which the recommendations formulated by the various committees was deficient. The members of the committees assembled to consider the chemical problems of air pollution decided early in their deliberations that the makeup of the committee was such as to make it inadvisable for them to consider problems involving reactions occurring in the atmosphere. The majority of committee members were analysts. They took the position that recommendations on atmosperic chemical reactions would have to be deferred until next year, or until a

more adequate representation could be made.

This situation illustrates some of the implications of comments by Professor Phair. We had a situation in which trained chemists were applying themselves to research in the air pollution field, but they concluded that their specific disciplinary interests were not adequate to cope with the challenging and difficult problems which lie in the field of chemical kinetics. The chemistry of air pollution has proceeded in the past seven years at such a pace that it is impossible for those of us who are charged with staffing laboratories to consider categories of professional interest. We have to consider the requirements of the particular problem and, no matter what a man calls himself, if he has appropriate qualifications we hire him. The breakthrough has come from photochemists, biochemists and other variety of persons. In no case are they concerned with particular professional connections.

VERNON G. MACKENZIE: This omission was recognized in the report.

DR. JAMES H. STERNER: This discussion emphasizes the need for a synthesis of the cumulative effects from all of our respective environmental contributions. Who is to accept the responsibility for adding up and balancing the various elements? How do we develop the "generalist" to deal with the total problem?

DR. JOHN J. PHAIR (Dept. of Preventive Medicine and Industrial Health, University of Cincinnati, Ohio): One approach to the problem is to bring into graduate teaching the general concept of epidemiological methods and their applications. We don't know exactly how to involve in our graduate training in occupational health and environmental medicine all of the people and disciplines concerned. In tackling most research problems today there is the necessity of bringing together competent individuals of broad experience and training in many areas. We must learn what can be done to get those people engaged in research and teaching in the fundamental sciences into a working relationship with those in physical and engineering sciences so that they recognize certain areas in which they can be mutually helpful. This must be started cautiously until it is known what can reasonably be done.

My belief is that neither engineers or physicists are sufficiently trained in the basic sciences to go off and study these problems alone. Somehow or other they must get greater depth of training at the same time. I am fearful that the basic scientist, by the very nature of his work, is not going to venture into these fields of needed activity until and unless we can bring him into the field by showing him that these are problems in which he can help.

Many of these problems in the field of applied science are as interesting and valuable as most of the ivory-tower projects that the basic scientist customarily chooses. I don't think the needed challenge is having more money but of being of some service to humanity. This is the thing that catches the interest of the medical scientist. No problem is too great or too small if it ministers to the health and welfare of human beings. We should use this opening to bring into this field those individuals whose talents are most needed.

DR. JOHN WISTER MEIGS: I would like to speak on this subject from the point of view of occupational medicine. Over the past few years it has become clear that scientists working in a variety of fields are meeting the same basic problems; problems of biology, chemical enzymes, protein chemistry, etc. I would like to make a plea for an arrangement in which many are concerned — a plea for closer integration of teaching in schools of public health and schools of medicine. We have an opportunity in schools where there is a public health program to indoctrinate the undergraduate medical student with better understanding of the influence of environment on health. Most physicians today are not well prepared in that. Many are hardly prepared at all.

There has been a tendency in the past couple of years to separate even further the training of people in public health from the training of people in medicine. This I believe is a step in the wrong direction. I believe that if we are going to be jointly concerned with effects of environment on man we should try every step possible to bring together professionals in areas where they are jointly concerned. I am not suggesting that we teach details of engineering or chemistry to physicians, or details of medicine to engineers or chemists, but I am suggesting that unless we bring them together more in their training process they will continue as at present to operate as if those in the other fields do not exist. These individuals may face a problem 25 years later and find out that there is a whole body of information of which they are ignorant.

VERNON G. MACKENZIE: This interdisciplinary mixing should take place not only in the schools but operational environment as well. In the air pollution program we have been impressed with the need for interdisciplinary cooperation. To promote the necessary cooperation between these disciplinary groups we have to mix them some way. This is hard to do and there is an inherent resistance to it. It has been attempted in part by the Public Health Service in some meetings and in part by some other organizations with

mixed success. It is not all straight forward and easy to do.

COL. JACK C. CARMICHAEL (USAF [MSC] Chief, Engineering Branch, Office of the Surgeon, Air Material Command, Wright-Patterson Air Force Base, Dayton, Ohio): Within this field of occupational health and public health we have need for each of the professional disciplines. We in the Air Force recognize the need for each one. We strive for and emphasize a team approach. No individual, regardless of whether he is a doctor, an engineer, or a chemist, has knowledge to solve all problems. This is where I want to take exception to some of the recent philosophy. We should retain our individual professional categories. We should work together as a team on the job. Our observation in the Air Force is that we need a cross section of engineers. We use civil, mechanical, electrical, chemical and sanitary engineers in our program.

I am appalled at the lack of information that a great majority of young engineers have about our program, about the field of sanitary engineering, and also about the field of industrial hygiene. We have great need of indoctrinating undergraduates in how important, fascinating and interesting this field of sanitary and industrial hygiene engineering can be. We have found our greatest success when we work young engineers hard at a professional level and treat them as professional people. I feel we must keep both individual professional identity, and weld the individuals together as a team.

ARTHUR C. STERN (Chief, Community Air Pollution Program, Sanitary Engineering Center, U. S. Public Health Service, Cincinnati, Ohio): We, too, have had the problem of where to obtain people to do research in air pollution. We have decided that the conventionally trained sanitary engineer is not the man to do it. His whole basis for training has not fitted him for air pollution research. We have had to adopt the approach of bringing people in because of their specific chemical or physical specialty. Even beyond the specialties mentioned — chemistry, biology, etc. — our research is pulling us into areas where we can't employ trained people, i.e., in electronics, missiles, etc. In these fields we have to get consultants by contract from places where these types of specialties exist.

WILLIAM L. FAITH (Managing Director, Air Pollution Foundation, San Marino, California): I think there was no intention of playing down the need for work on the chemistry of polluted atmospheres. We have only scratched the surface in this field. About 80% of the work being sponsored by the Air Pollution Foundation is on the chemistry of a specific atmosphere — irradiated auto exhaust. No work is being done on the chemistry of the dark reaction. One other item: Mr. Stern made a plea for the establishment of outdoor maximum allowable concentration of materials. This would be a most difficult matter, but there is a need for an understanding of what are maximum allowable concentrations of various gases in the atmosphere.

Diethylenetriamine

Safe handling procedures for diethylenetriamine are described in a new chemical safety data sheet published by the Manufacturing Chemists' Association.

Diethylenetriamine, a yellow liquid smelling strongly of ammonia, may cause burns to the skin or eyes and repeated inhalation of the vapors may result in an asthmatic type response. It is used as an intermediate in the preparation of textile, paper and agricultural chemicals, in coatings and adhesives, in the polymerization and vulcanization of natural and synthetic rubber and in numerous other applications.

MCA's new safety data sheet covers the properties, hazards, employee safety, handling and storage, tank cleaning, waste disposal, medical management and first aid. Copies of *SD-76, Diethylenetriamine* are available at 30 cents each from the Manufacturing Chemists' Association, Inc., 1825 Connecticut Avenue, N. W., Washington 9, D. C.

Research Problems in Occupational Health

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Industry-wide and nationwide problems concerning the worker and his materials, his machines and his relationship with other workers suggest the need for progress from a selective and opportunistic attack on occupational hazards to one of balance, coordination and broad perspective.

The scope and treatment of this area of our discussion would be much easier if we could confine the concept of "occupational health" to that of a few decades past. The change in focus from "industrial" to "occupational" has widened significantly the field of interest. In addition, the increasing recognition that man-at-work is the resultant of forces and influences from the total environment could, with some validity, extend our reference to engulf a major portion of private, community and public health. It is the importance, number and urgency of problems more directly related to the generally accepted areas of "occupational health" that will define the limits of our discussion, in keeping with the counsel of the conference planners that our attack be balanced rather than selective and opportunistic. Inevitably, as we develop certain aspects, we shall have to firmly restrain centrifugal impulses, to accomplish even a part of our core objectives.

In our attempt to enumerate some of the more important problems resulting from man's projection into the occupational environment, we shall arbitrarily discriminate three main categories of interaction: (1) Man and Hazardous Chemical and Physical Agents, (2) Man and Machine and (3) Man and Men. These categories are not mutually exclusive in their occupational relationships, and the interfusion with elements of the nonoccupational environment will be frequent and indistinguishable.

We will pose certain questions which need answers; the emphasis will be on those which are immediate and pragmatic, and without any attempt to establish a priority of importance. The solutions to many of the problems will involve intricate interrelationships, with important contributions to be developed from other than direct occupational health sources, and the values obtained in this field will find applicability to many other areas. The items cited will be only a small part of the total needs in this field, and with our present limited knowledge and the rapid and expanding involvements of occupation and environment, we can expect many additional questions will arise from each solution to our original queries.

Man and Hazardous Chemical and Physical Agents

The problems resulting from the introduction of hazardous chemical and physical agents into the occupational environment make an appropriate beginning for our discussion. Their consideration has a traditional sanction, and the volume and interest of the effort which has been expended, and presently is being devoted, to their control attests the magnitude and importance of the problem.

For a few substances (the American Conference of Governmental Industrial Hygienists list less than 300 threshold limit values) criteria have been established for the purpose of defining a reasonably safe and healthful working environment. The value and limitations of these criteria have been the subject of many excellent and discerning discussions. Few experienced and critical industrial hygienists have illusions that the laboratory experiments and clinical studies from which the more highly accepted limits have derived their validity, apply with equal reliability to exposures actually extending over the full working lifetime.

Question: How reliable are our criteria (such as threshold limits) in terms of remote and more difficultly identified effects — shortening of life span, cancer, interference with work effectiveness? What is the significance of these param-

eters of exposure to the individual, to industry and to society?

The problem is not simply that of improving the acuity and accuracy of our methods for detecting injury, or more properly, for determining the absence of harmful effect. Admittedly improvements of this sort are badly needed — and an urgent area for research — but even if we were able to define accurately, in the case of a particular chemical, a slight degree of injury in the complex of other factors influencing remote changes in health or longevity, we would still be faced with the problem of weighing the significance of this finding in relation to the benefits to the individual from his employment, to the costs which industry must meet in applying further control measures, and to the value of the product to our society.

We would be much more complacent with respect to the reliability of our criteria for chemical exposures if the developments in the area of radiation effects were not so constantly and emphatically before us. Even though we recognize the probably broader implications of the radiation problem, the acceptance in establishing threshold limits of such remote measures of injury as shortening of life span and detrimental effects on future generations must cause us concern in contrast with the paucity of such information for many common and ubiquitous industrial chemicals.

If we attempt to extrapolate the effort in terms of personnel, time and dollars expended to achieve our present knowledge of radiation injury, to the solution of our problems with common chemicals in industry and commerce, it becomes strikingly clear that more effective and more economical techniques must be developed.

Question: Can we develop methods for evaluating occupational hazards — particularly remote effects such as shortening of life span, cancer, genetic damage — which will be reliable, practical and economically reasonable?

With the synthesis of hundreds of new chemical components a year, with the acceleration of the transition from laboratory curiosity to industrial application, the need for more rapid and reliable methods for determining tentative threshold limit values is acute.

Question: How great is the need for more economical and yet more meaningful techniques for evaluating the hazard of new chemicals? Who should do it? Who is competent? How do we make the results of such research available to all?

Accidental overexposures occur in spite of our best safety efforts, and with them the need for effective methods of treatment.

Question: How much effort is justified in the development of specific therapy for occupational intoxications? Who is responsible for such research — and how do we stimulate and coordinate it?

The reasonably good safety and health record thus far has been achieved by inserting as large a factor of safety as possible in the threshold limit. Where the engineering or operational control needed to meet this limit has been easily achieved, an excessive safety factor is justified. Where it has been accomplished only with technological difficulty and considerable installation and operating cost, any excess effort must be regarded as wasteful. The decision is not simply one of injury versus dollars, but involves cost of product, standard of living, and ultimately productive effectiveness of the community.

There are many additional problems in this area, which require urgent attention. Little is known concerning the effect from two or more toxic agents in a simultaneous or sequential exposure — a problem in community air pollution as well as in occupational health. What are the relationships, if any, of liminal or subliminal concentrations to the aggravation of disease common to the general population, or to work effectiveness?

The extent of carcinogenic effects from occupational exposures, to chemical as well as physical agents, has had only token study. Reliable experimental laboratory methods must be developed, and new and more discriminating epidemiologic techniques applied. The very nature of the problem requires large population studies, frequently involving many occupational groups widely scattered throughout the country.

Question: How do we organize research when the investigation involves a whole industry or segments of industry widely scattered through many communities and states? Who accepts the responsibility for the initiation, coordination and costs?

Man and Machine

The problems raised by the interaction of man and machine are no less involved than those described above. The area of direct traumatic injury has become the interest and concern of the safety engineer. Considerable progress has been made with such problems as the guarding of dangerous equipment, the motivating of people to safe practices, and the recognition and acceptance of the importance of accidents in terms of suffering and economic loss. We have much to learn and understand of the basic causes of accidents, particularly in terms of human conduct, before we can achieve the goal of an irreducible minimum.

Question: What kind of research, what new

approaches to the problems of causation and of prevention of accidents is likely to give us the greatest yield?

An area in which interest — and concern — is really just developing is the relation of the increasingly automatic machine and the people who operate it. The problems generated involve elements such as fatigue — physical and mental, job motivation, and job satisfaction.

Question: How can we measure effectively, in terms of physical and emotional response as well as work efficiency, the healthful limits of man-machine interaction?

A related subject, with a direct bearing on productivity, is the design of equipment with greater consideration for the abilities and capacity of the operator. A great deal of valuable research on this problem has been done, but better means must be developed to bring this to the attention of and utilization by the design engineer and production supervisor.

Man and Men

The relationship between man in his occupation, and his supervisor, his co-workers, his subordinates, his customers, his suppliers of goods and services, is at once the most interesting and the most complex of the environmental contacts. The increasing frequency with which we meet such terms as "human relations," "supervisory training," and "industrial psychiatry" is ample evidence of the awakening recognition that problems involving the interrelations of people in the occupational milieu are important and need solution. The limitation of time, and the serious doubt that this subject was intended for presentation in this conference will permit only this brief identification of the problem.

Conclusion

These references to research needs in occupational health have been made in general terms and, even thus, included only a portion of the total problems immediately confronting us. Such vital elements as the securing of adequate personnel and facilities connotes the development of training programs, of motivation and education needed to provide the necessary support, of stimulation of a sense of responsibility by industry and commerce, by the community, and by government to see that the job is done.

There is promise, from just such efforts as this conference, that we may progress from a selective and opportunistic attack to one of balance, coordination and broad perspective.

Occupational Hazard

Japanese men like to be attended by women, which accounts for the fact that there are 37,400 girl caddies in Japan. There are also 1,200,000 golfers in Japan, compared to 4,000 before the war, including geishas who play because their patrons expect them to sympathize intelligently. The consequences of this golf boom have been felt most directly by the girl caddies. For although the million or so novices are extraordinarily keen about golf they are not very good at it yet; they constitute a vast army of duffers swiping wildly at the ball. As a result, 500 girl caddies were conked last year, and 29 were knocked cold at Tokyo courses alone.

Realizing it will take some time before the duffers straighten out their duck hooks, Japan's safety-conscious Ministry of Labor has recommended protective helmets, dugouts and ducking practice for caddies. Said Moritsugu Baba, Chief of the Odawara Bureau of the Ministry, after a perilous tour of the links: "One usually thinks of golf as a refined game for gentlemen, but it's more like wandering around front lines."

Said one girl, as she tried on the first of the bright yellow plastic helmets last week: "Feeling of security far outweighs helmet's weight."

—By special permission from *Sports Illustrated* magazine, September 21, 1959.

Summary and Discussion

Research Needs in Occupational Health

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Discussion by this group is related to two general areas of research needs: (1) Methods for appraisal of occupational hazards in the laboratory and in the field, and (2) Applications of epidemiologic methods to the total field of occupation in order to learn the impact of occupation on man. Inherent in learning what may be the impact of occupation on man is the need for information about the common chronic diseases.

Principal Topics Discussed

Although methods for studying occupational hazards are being used regularly and many new chemicals are being evaluated for toxicity, the number of new compounds and new combinations of old compounds is almost infinite even over a short space of time. It was suggested that one approach to this might be continuing surveys of what is actually happening in industry, with some quantitative estimate of numbers of situations in which a new compound is used and numbers of workers exposed. Results of these surveys could be used as a basis for priorities in determining what research needs to be performed. Admittedly this does not answer the problem of avoiding introduction of every hazardous new chemical or combination.

The need was stressed for coordination of occupational health research with other research in public health as well as preventive medicine. It was pointed out that many, if not most of the problems mentioned at this conference had come about because of industrial technology. Closer integration of occupational health activities with professional efforts in related fields might permit meeting research needs with conservation of over-all effort. Mutual understanding between personnel in different areas of public health is part of the research problem.

Specific areas for study which might contribute to understanding the effect of occupational hazards on man included: Physiological and biochemical studies to provide methods for detecting minimal deviations from normal. These should include the exploration of previously unexplored or only partially explored biological systems. The response of ciliated epithelium to small doses of toxic chemicals is an example.

Results of this kind of study might provide much needed information on what to look for in the environment. If we knew what to look for, we might then set up projects to determine how to detect these environmental factors.

These studies would also include consideration of man's basic physiology in relation to work stresses. One example might be exploration of the effects of physical effort, that is, exercise or lack of exercise on a variety of physiological functions.

In relation to control of occupational hazards, including accidents, studies are needed on man's behavior, to try to learn more about why he does what he does.

Regarding the need for application of epidemiologic methods, there was considerable discussion of the related problems of personnel and facilities. Although these problems also are important in relation to laboratory studies previously summarized, they are particularly acute for epidemiological studies. Complete and accurate records of workers rarely are available. This is not just because of administrative problems in prying records loose from medical departments. The actual records rarely contain the details needed for a particular epidemiological study. One reason is that the doctors and nurses who maintain these health records rarely are trained in epidemiology and are therefore not alert to the possibilities. Expansion of numbers of epidemiologically trained physicians is necessary. It was suggested that occupational health teaching programs should stimulate faculty mem-

bers in all other special areas of medicine to recognize the opportunities for finding some of the answers to their problems about chronic diseases through cooperation with specialists in occupational health.

Another major need is an increase in the size and scope of the occupational health program of the Public Health Service. It was emphasized that present budgetary restrictions do not permit needed laboratory studies or epidemiologic investigations even on the old, well recognized occupational diseases.

There was general acceptance of the need for careful studies of the development of chronic diseases in employed adults. These epidemiologic studies might provide a baseline for evaluation of the influence of specific occupational hazards. It was recognized that these studies would be basic to all adult health efforts. This again emphasizes the need for the team approach and interchange of information among all professional groups concerned with a particular health problem. For example, in all these epidemiologic studies, sociologic and economic information should be developed and included.

No formal recommendations were adopted but it was the consensus of the group that greater support should be given to the Public Health Service program in occupational health. There should be continuing close coordination of this with the health areas represented at the Robert A. Taft Sanitary Engineering Center.

GROUP DISCUSSION

THEODORE F. HATCH (Professor, Graduate School of Public Health, University of Pittsburgh, Pennsylvania): I have been impressed with the fact that we have been spending more time in discussion of how to get people with proper competence and special skills to work on environmental health problems than with the significance of one area of research as compared to another. It would not be difficult for anyone here to write down a list of items on which research is needed. So, we have turned to the question of how to get research done. We have agreed on the need to bring people into the field from the basic sciences.

In the field of occupational health, I have seen the field develop during the last quarter of a century from the time when it was essentially research — in the field, as well as in the laboratory. As findings of research became available, more and more people became occupied with application of this knowledge to the solution of occupational health problems. There has been great dependence on the use of principles and techniques which came out of this early research. Today we have engineers whose primary interest is directed toward details of the environment. Chemists are increasingly occupied with refinement of analytical methods and physicians with specific medical details. With this attention to details within our respective areas there is danger we will lose sight of the continuing need for teamwork which means more than bringing people of different disciplines together in one room.

Each one of us having special competence should recognize what we have to contribute, but we must also know about the contribution from other disciplines in order to practice our own skills more competently in the field. The real need is a mutual understanding of our problems so that we can bring them to the attention of men in the basic sciences and interest them in undertaking necessary research. I would like to have seen more emphasis placed in our discussion on the need for really significant integration of the biological and physical sciences in the study of environmental health problems.

ARTHUR C. STERN: We must learn how to translate information gained from industrial exposure into standards for the general population. Unless we learn how to cross this barrier, we will make our job much harder by having to re-do all the good industrial hygiene work already done.

More Lead, But Not More Danger

The lead content of gasoline could be raised to a new level of four cubic centimeters per gallon and such change would not significantly increase the hazard to public health, if certain precautionary measures are taken according to a committee of advisors whose views were made public recently by Leroy E. Burney, M.D., Surgeon General of the Public Health Service.

The ad hoc committee was convened by the Surgeon General following the industry's expressed interest in increasing the concentration of tetraethyl lead in motor fuel. The Surgeon General emphasized that the Public Health Service has no legal authority to control the lead content in gasoline. He said that the committee's findings should not be interpreted as a regulation of the Public Health Service or as an agreement with the industry. If industry does increase the tetraethyl lead content, however, he urges that they take the precautionary measures outlined by the committee.

Concluding Statement

MAN IN A COMPLEX ENVIRONMENT

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In* The Education of Henry Adams *it was suggested that the necessity for improved education increases proportionately with the coal output. Our industrialization has brought progress and problems which must be balanced with education. As Adams noted: "For a thousand years man has kept in step with his changing needs; he probably will continue to do so, only now he will have to jump."

The entire Conference on "Man Versus Environment" may be described as a reasonably comprehensive look at the complex environment of man. As the speakers looked at this brave new world, it is apparent that the routes chosen were in some instances familiar and orthodox; in others, new casts of players were utilized. The principal problems examined were those of water and wastes, air, food and occupation.

The purposes of the Conference may be described as threefold: (1) to find out what we do not know, (2) to delineate what we ought to know and (3) to explore how we may accomplish the second major objective. Essentially, we are faced with a problem in ecology; that is, the influence of the total environment on the behavior of living things. To examine this problem, we must describe a vast amorphous area in which there is an interaction of a variety of functions. Thus, we not only look at man in his environment, but at all organisms.

Out of the deliberations of this Conference comes not a poverty of ideas, but a surfeit of riches in variety and in detail. In that very detail lies a great deal of our problem of analyzing a new kind of objective. The objective is familiar: to go through this forest of suggested rich ideas and emerge with a purposeful program. The search for a new world is an old one, since we are designing and will be designing an environmental Utopia. Sir Thomas More's concept of a Utopia is approximately 440 years old. In some respects, it is never attainable. If attained, it would not, necessarily, have all the attractiveness that we might attribute to it. It might have a new set of stresses and strains, if for no other reason than to amuse us.

Components of an Environmental Complex

There are two routes that I might travel in summarizing the presentations in the Conference. I choose the second of these two routes. The first would be to repeat and review all the specific areas of research which have been delineated. I have chosen the second route, which may be more interesting and profitable. This constitutes an attempt to link together environmental complexes which may be common to all the fields described. The common aspects of under-priming not only describe and disclose each of the areas, but actually link them all together. The environmental complex of which we speak has physical, biological and social components. There are multi-causes of common disease and hence the control of disease involves multi-disciplines.

Why does not everyone succumb to amoebic dysentery in those countries where it is endemic? The disease process with which we deal today involves three features instead of one. It involves the host, the agent and, lastly, the environment. We now understand that the tubercle bacillus is is not the sole cause of tuberculosis, but one of the causes of tuberculosis. Reduction in the incidence of such a disease was difficult, therefore, because it was a disease of environment, society and occupation.

The interrelationship between an empirical approach and a basic science approach to the control of the environment is again an area for speculation. Ours is an age of empiricism. We cannot wait, or do not wait, for all the scientific demonstration of cause and effect in every area of activity. Our controls for the future are likely to be based partly on empiricism, partly on scientific proof, and partly on epidemiological cues.

A Summary of Recommendations

With that description of our setting, the recommendations that come out of our discussions appear as follows:

Epidemiology

We must of necessity make promptly a more intensive and profound use of that good old tool, epidemiology, as an analytical discipline. With this we must correlate clinical and experimental observation, in order to narrow the area of ignorance in control of the environment. Epidemiologic inquiry, in its oldest sense should disclose not only the boundaries of ignorance, but also criteria for some empirical action. We have not made complete use of these tools. We need a sharper identification of the cause of disease, than has been the fortunate state of affairs in the case of infectious diseases.

Instrumentation

As additional tools, we must develop methods of study with the newest, as well as the more familiar, instrumentation. We stood still in many areas of inquiry until the microscope was invented. The microscope opened up a new world. The spectroscope, in all fields of biochemistry, is in turn disclosing greater vistas. It has been well stated that "scientific activity has always been conditioned more by available methods for study than by the relative importance of problems."

The intensive challenge of radiation has existed for a matter of only 15 years. In that 15 years the development of instrumentation has been tremendous, in order to provide prompt answers to many environmental problems, even while the biological criteria for action were still being sedulously sought.

Criteria

Sound criteria to guide public and private action represent another prerequisite to intelligent programming. These are not tasks for which the Public Health Service is solely responsible. They are tasks in which government, universities and industry must all participate. We must develop ways of measuring our criteria, and of establishing the levels of those criteria which should lead to action. Radiation exposure and its realistic control, for example, is a new art. Criteria must be developed to guide us in all the new areas so elaborately spelled out at this Conference.

Personnel

We must give consideration to the development of appropriate personnel. Who is to do these things? The functions described are ultimately dependent upon people who will develop ideas; machines will not develop ideas, although we may look now to machines to speed up our tasks.

Again, the development of personnel involves a problem of the integration of disciplines, while, at the same time, we preserve professional identity. Some American universities have tried to do a better job of integration. We face the question of how to bring scientists together, even when their offices are next door to each other. It is the task of the Public Health Service at least to show the way in its own operations. There must, for example, be some relation between cancer and other fields — as one problem of integration.

I do not mean we should try to convert our new sanitary engineers into men of omniscience. To solve present and emerging environmental problems, however, our future sanitary engineers must be a part of a team, working with physicists, biochemists, chemical engineers, physiologists and others. Changing our sanitary engineering curriculum to include something in every area does not provide a satisfactory solution.

I am a strong adherent of the necessity of maintaining professional identity. Professional identity is more than a label; it is a necessary affiliation of people working in their own or adjacent fields of reasonably well defined character. There is an established field of oceanography. Why should there not be a field of sanitary engineering? The act cannot go forward unless everybody gets into it, without serious loss, however, of professional identity. Given the will, such an integrated approach must emerge.

In the development of personnel, we must find some way in which the generalist, or interdisciplinary worker, can be developed. In this total field of environment where is this spearhead to come from? How do we educate for a generalist? Is it possible to produce such a person? There are generalists in our history, such as Vannevar Bush. Another was Chandler, essentially a chemist, who built up a fine training school at Columbia University and was a leader of public health.

Additional Needs

The word "serendipity" has not been mentioned by earlier speakers. New discoveries and new techniques do not come about only through chance: they depend upon a more important element, the prepared mind of the investigator. Serendipity describes one of the facets for making such discoveries. This is a concept which could well be revived, perhaps by establishing within the Public Health Service a "Department of Serendipity."

We must, of course, list money as one of our needs. It is undoubtedly important, but it is not the major key to the things we are looking for. In this kind of world we cannot do without it. If I were to put money first, however, we would be searching for the wrong single ingredient of our brew.

Tasks of the Public Health Service

Now to define the tasks of the Public Health Service, as my personal understanding of what this Conference proposes:

1. We ask of the Public Health Service a working concept of environmental hygiene. This is simple in terminology, but very broad as to base. It must represent a collateral relationship in functions of many disciplines and, equally important, a wholehearted sympathy with such a concept.

2. We look to the Service for leadership in the cross fertilization of disciplines. It has the opportunity to bring people together in daily work as well as in intermittent conferences.

3. In the area of environmental hygiene, the Service can design a workshop for the engineer, biologist, physicist and social scientist where they work jointly, with the corridors so constructed that people must bump into each other.

4. The Service should make maximum use of communications to insure that various disciplines related to the environment think jointly with the increasing aid of mechanical devices of automation.

5. These functions lead to another task, namely, to provide the aids for selection of objectives in the field of environmental control. There are different levels of priority, and the Service must do its best to establish what these priorities are on a moving chronological scale; what things come first in environmental control?

6. There must be a realistic appraisal of semantic slogans versus supportable guides for scientific and technological action. Reflections of popular interest and desire are not necessarily warranted as guides for programs. People working in this field have a responsibility for separating what makes sense and what does not make sense in a realistic effort.

May I close by noting that ours is an obviously complex task. Dr. William H. Welch, working in the 1900's, who was such a generalist as I have cited, must have thought his world complex in terms of need for the analysis of water. Today, I have the same optimism.

Water Work

Taste and odor in public water supplies will be investigated in a twelve-month research program at the Franklin Institute, Philadelphia, under the sponsorship of the Manufacturing Chemists' Association.

The program, to be directed by Senior Staff Engineer Robert A. Baker, is part of a project by MCA's Water Pollution Abatement Committee to accumulate information meaningful and useful to the public, the chemical industry and governmental regulatory bodies in the control of water pollution.

Information arising out of other studies will be made available to those engaged in the study. For example, an unpublished survey by Mellon Institute on odor components in steel mill waste-water discharges will be utilized. Results, it is thought, may reveal gaps in the existing technology and indicate where further research is necessary.

In discussing the program, J. T. Garrett, chairman of the MCA's subcommittee on the characteristics of chemical waste, said that industry and population growth has led to increased regulatory pressure to ensure that public water used in and discharged from commercial or municipal operations shall not be so polluted as to impair its value to other riparian users.

An additional research program on water pollution abatement under sponsorship of the Manufacturing Chemists' Association has been in operation for the past five years at the Academy of Natural Sciences of Philadelphia. Studies in this program show how a river recovers from the effects of pollution with the progressive return of bacteria, algae, fish, invertebrates and other life forms natural to a healthy stream.

Industrial Water Supplies and Occupational Health

Water is the life blood of industry. In many portions of the country waning water supplies constitute a dire threat to the continuation of industrial pursuits. Since increases in water supplies are little in prospect, conservation of now available water energetically is being fostered. One area of food processing in California has found it possible to carry out its activities with only 10% of the water formerly used.

In this crucial situation the dependence of occupational health on abundant water may not be obvious. Few industrial physicians have become alerted to the significance of curtailed water supplies in their medical programs. For this reason six affronts to occupational health are presented in exposition of the threats to preventive medical activities that will appear when industrial water is in short supply:

(1) For some decades one standard procedure in the protection of the health of workers, and particularly in dusty operations, has been the substitution of wet methods for dry ones. Thousands of installations have been made. The well designed and maintained ones have promoted health and saved lives. For one example, in hundreds of large scale spray painting departments the spraying is directed against water baffles thus keeping harmful agents out of the atmosphere — breathed by workmen. In the future there may be a reluctance to install wet methods and some workers may suffer thereby.

(2) Harmful industrial wastes discharged into streams are of minor concern to workers in a plant, but of major concern to the immediate community and communities further along the stream who may obtain their municipal water supplies from that stream. Water in short supply may mean less waste dilution and conversely higher water contamination. The reach of industrial medical responsibility extends into all such situations.

(3) Water is the life blood of the community as well as of industry. Where there is industry there is always a community. Industry is a citizen of that community and should be a good one. Lack of abundant water for the community almost guarantees its ill health. No industry has the right to gobble up and waste water when that means inadequate water for the community. Should there be no water at all except for drinking purposes, an unlikely prospect, dreaded disease epidemics may be inaugurated within four days. Industrial medical enterprises have the obligation to consider the community as well as the industry itself.

(4) In some areas, air conditioning in occupational pursuits utilize as the coolant ground water of low temperature. As water fails these systems will fail although they might be replaced by chemical refrigerants. Air conditioning promotes comfort and health. When failing water supplies curtail that form of health promotion just one more detriment appears.

(5) The cleanliness of many industries and their products depends upon water. Flushing, scrubbing and flooding are an essence in the procurement of acceptable sanitation in some industries and a degree of such is common to all work pursuits.

(6) There is not even a meager prospect that the trickle of industrial water will become so thin that plant drinking water supplies will be in jeopardy. When that time comes that industry no longer will exist. Likewise, water economy should not hamper facilities for the washing fountains and for the many industries in which full showers contribute to health. Needful as is the coming of industrial water stinginess, the hope is that water conservation may not be at the expense of health conservation.

Presented at the Conference on Industrial Water Conservation, University of Michigan, Ann Arbor, June 8, 9, 1959. Proceedings of the entire conference are obtainable from the School of Public Health, 109 South Observatory Street, Ann Arbor, at a nominal cost.

Industry's Stake in

WATER CONSERVATION

• R. M. CRITCHFIELD
Vice President
General Motors Corporation
Detroit, Michigan

Since estimates forecast a tremendous increase in demand for water in the future, industry must learn to use water as economically and efficiently as other raw materials are used.

We in Michigan are fortunate in living in the state which has the longest coast line exposed to fresh water in the United States. Our two newest states, Hawaii and Alaska, may boast of a longer total coast line, but they are exposed to salt water which is of limited use for industry. Here in Michigan we have an almost limitless supply of good water all around our state.

Last month at the 14th Industrial Waste Conference at Purdue University Mr. Gordon McCallum, Chief of the Division of Water Pollution Control for U. S. Public Health Service, pointed out that by 1980 the predicted total water use will exceed the available supply by 100 billion gallons per day, and that many streams are expected to be used several times over in their passage to the oceans. This, basically, is the problem we are confronted with today. We have an established maximum quantity of water available to us and, at the same time, a rapidly increasing population, both industrial and municipal, which demands water in ever increasing amounts.

There are many estimates on how much water we will use in the future, coming from several different agencies. Most of the estimates are based on trends in population growth and estimated increase in per capita consumption per year, and depending on the factors selected, these estimates vary widely. In spite of this variation, the estimates all forecast a tremendous increase in demand for water up to and beyond the point of water availability. This means that some parts of our country will certainly be forced into reuse of water which has gone through city municipal systems at least once.

This is nothing new. Some of the communities along the White River in Indiana are already using so much water that the river is used six times over during its passage through the state. The Ohio River and the Miami River are already being used three times over their dependable low flow rates.

Forecasts of city usage show the same trends. For instance, it is estimated that the water used by metropolitan Detroit will more than double by 1980, and that by the year 2000 the population of metropolitan Detroit will have increased to over six million people with a water demand of over two billion gallons per day, or three times the present amount.

It is estimated that we will have a population of 200 million by 1975. Putting this in terms of water use, we are told that where we now use 250 billion gallons of water per day we must be prepared to provide 450 billion gallons per day by 1975, and we have learned by experience that our forecasts usually are on the low side. As an example of how wrong we can be in forecasting our needs in these days of tremendous and unexpected industrial and population growth, the city fathers of Houston, Texas, forecast in 1943 that they would be using 268 million gallons of water per day by 1970. By 1955 water demand had developed so rapidly in the Houston area that they were forced to revise the estimate upward to over 700 million gallons per day by 1970.

These estimates present us with a problem not only in setting up means of transporting this much water to the various points of use, but in making sure that we have this much usable water available to us.

Who is going to be responsible for this increase in the use of water? By 1975 it is ex-

pected that industry may be using 80% of the total water being supplied.

A large increase in water consumption is also expected from the public because of a rapidly increasing demand for water-using appliances in the home, such as automatic clothes and dish washers, garbage disposals, air conditioning equipment and swimming pools.

We are also concerned about the serious fall in the water table in areas where well water is the main source of supply. This has been called to our attention before, but little has happened in the past several years to help the situation. We have a plant in the Southwest, for instance, which is already drawing water from wells 2,600 feet deep and the water table is falling fast. For our own protection we must move quickly into finding or developing surface water supplies in such areas.

We can build plants anywhere there is an available labor supply. Materials can be shipped in by rail or truck to whatever location we choose. We can establish markets and get transportation to these markets, but if the plant runs out of water it is dead over night. All life, industrial or otherwise, stops when water is taken away, but this is no signal for a wringing of the hands. This is a challenge, an opportunity, a problem in process development. How can we so engineer our processing that we can get the same results with less water?

We, as industrial people, have an additional responsibility to the states and to the country as a whole. This responsibility is to return to our streams process water which can be used by others, and we must make sure therefore that no harmful materials are discharged with it.

Most of our industrial people will quickly point out that they have installed good, and usually expensive, waste treatment plants which make sure, at least in the light of our present knowledge, that no toxic materials are discharged to the stream. This might certainly be the case, but as far as water conservation and reuse are concerned, we should look forward to further development in our industrial waste treatment processes. At the present stage of the art we just do not know how to do this on a volume basis.

Here is one of the challenges in front of us today in the conservation of our water supplies. We pride ourselves in having efficient waste conservation and waste treatment plants that prevent toxic materials from reaching the streams, but we still have to develop treatment processes which will produce water of a suitable quality for industrial and other reuse.

We have to learn how to set up chemical processes so that the loss of chemicals is kept to an absolute minimum. Incidentally, by doing this we not only minimize the problem of waste treatment, but we save on the cost of replacing these chemicals. We have to learn how to develop economical waste treatment processes which will come closer to delivering water as good in quality as the original water received by the plant. We do not know how to do these things yet, but we must learn how to do them if we are to keep ourselves supplied with usable water.

In another area of the problem, we may face the possibility of new and more restrictive legislation on the use of water in our various states. The proposed uniform water use law developed by the legislative research center at the University of Michigan in 1957 and approved as a model act by the National Conference of Commissioners on Uniform State Laws in August 1958, sets forth certain legislative thinking which may be entirely different from what we have been accustomed to in the past.

Previously we were inclined to consider water flowing past or on our property as being ours for the using. In the proposed water use act it is premised that the individual has no right to such water, but that these waters belong to the state and that the state, therefore, should be in the position of deciding who should use such water and how much they should use. In its most extreme application, such legislation could spell the difference between life and death for an industry, depending on whether the water resources commission set up by the state believed that the industry in question was more or less beneficial to the state's economy than other water using activities.

Just what avenues are open in making sure that we have enough water? First of all, can we secure more water? Some industries are in a fortunate position in this respect. If they are located on the shores of large bodies of water, such as the Great Lakes, they are fortunate indeed as they have an almost unlimited supply of water at their disposal. Most of us, however, are not so fortunate and we must depend on water supplies obtained from inland sources of limited capacity, piped to our plants in mains of limited capacity and subject to overloading by increases in population of the areas in which we are located.

Second, can we make use of the water we now have available to us and fit the plant to it, including future expansion of the plant? I think it is obvious that few of us would be willing to expand present plant operations on the basis of having no more water available if we continue to use water in the ways to which we are accustomed.

The third approach, of course, is to learn how to use water economically and efficiently

just as we do any other raw material we buy. In the industry I represent, we make every effort to use our raw materials as efficiently and economically as we possibly can.

Water is just as important a raw material in manufacturing as the steel, paint, plating chemicals or the upholstery materials used. We must learn to use water just as economically as we do these other materials.

What has General Motors corporation been doing in an attempt to help water authorities make most efficient use of the supplies that are available? In 1957 the Corporation used 72 billion gallons of water. We feel sure that if we had no conservation program in effect we would have used well over 100 billion gallons in that year. In one plant alone, aggressive conservation engineering cut down the daily water usage from two and a third million gallons to 800,000 gallons per day over a period of nine years. In other words, they were able to operate with only one-third of the water they formerly used in spite of increases in plant size and equipment. For that community alone, one and one-half million gallons of water per day was made available for other uses.

In another community faced with serious water shortages, the local General Motors plant swung into a vigorous and effective water conservation program which resulted in saving well over one million gallons per day for the community. If every plant of comparable size in this country could put on such conservation programs, think of how much value the additional water would be to the community. And think of the tremendous amount of good will developed in these communities towards plants cooperating with them in such a magnificent fashion.

In the field of waste control, General Motors has spent well over 65 million dollars for equipment alone over the last several years for the control of industrial liquid and atmospheric wastes. This does not include the considerable amount we have spent to operate this equipment.

Generally, there are three basic reasons for cutting down on the use of water in our plants. The first reason for conservation is to assure an ample supply of water for the community in which we do business. Our plants cannot expand without employees, and the communities cannot take care of more people than they have utilities for. Imagine the position of an industry, known to be a lavish water user, in a community which is running short of water.

The second reason is to keep our usage of water within the physical limitations of the equipment and sewers we have already installed. When usage exceeds these limits, then it becomes necessary to install larger and more expensive water handling equipment and sewers.

The third basic reason is to cut the cost of water being used. It is true, of course, that in most places the more water you use the less the unit cost, but basically, the more water used by the plant, the higher the bill for that water at the end of the year.

Vanillic Diethylamide

A new drug that stimulates respiration was described as highly effective in avoiding complications and death from barbiturate poisoning. The first report of the use of the drug in humans was given before the American Society of Anesthesiologists meeting in Miami, Florida, on October 9. The chemical name of the drug is vanillic diethylamide.

Melvin L. Bernstine, M.D., Chairman of the Department of Anesthiology, Albert Einstein Medical Center, Philadelphia, described use of the compound in eight emergency patients in deep anesthesia from overdose of barbiturates. He compared this group with similar cases treated with other drugs.

"In the group treated with vanillic diethylamide, none expired and all except two were completely recovered within 12 hours," Dr. Bernstine stated. The two patients were elderly and required from 48 to 72 hours to return to normal, he reported.

Of the group treated with other stimulating drugs, Dr. Bernstine said: "Some of these patients required tracheotomy and all the deeper poisonings took several days to recover. In these cases there was also an appreciable percentage of complications and some fatalities."

Dr. Bernstine suggested that the drug "acts by stimulation of the medullary respiratory center." It causes an immediate deepening and slowing of respiration followed by an increase in respiratory volume of 100 to 150 percent of normal. There is a consequent increase in blood oxygen saturation and decrease of blood carbon dioxide. There is no significant increase in heart rate. Dr. Bernstine noted that, in patients whose blood pressure had fallen, the compound "apparently brought it back to normal levels," but it did not affect normal blood pressure.

Dr. Bernstine also told of its effects on patients under controlled barbiturate anesthesia after surgery. He said that patients given vanillic diethylamide required less than half the time to be aroused from anesthesia than did those not receiving the compound.

Side effects described by Dr. Bernstine are coughing, sneezing and itching which lasted a "short period." An experimental drug of the U. S. Vitamin & Pharmaceutical Corporation, it is not expected to be available for general use for at least six months.

The Need for

WATER CONSERVATION

Industry's Viewpoint

• W. H. SCHUETTE
Vice President and General Manager
Midland Division
The Dow Chemical Company

The main goal to aim for in the development of communities through industrial expansion is the fitting of the over-all long-range needs of industry and of the community to the water resource.

Home consumption of water has doubled on a per capita basis during the last generation. This has come about because we have devised new ways to use more water in the home — through automatic washers, air conditioners and the like — and have raised our standards of cleanliness and of the allied virtues by a substantial margin. We take many more baths than our fathers did and spend a great deal more time than they did watering our lawns and rose bushes and washing our cars. So it is relatively easy for the public to appreciate and understand that where a city has doubled in population, its water consumption has probably quadrupled.

The need of industry for water is more complex for the public to grasp. Various figures are published which well dramatize the enormous thirst of industry. For example, did you know that today's bakeries use 37 gallons of water to produce just one slice of bread? Or did you know that it takes 65,000 gallons of water to produce a single ton of steel?

Figures such as these, tossed rather pell-mell at the public, bring about an impression that industry wastes fantastic amounts of water. While this may in some part be true, it seems to me that it is not at all well known or understood that industry, in its constant effort to produce better, has experienced a multiplying need for water in exactly the same way that we have experienced multiplying needs for water in our homes.

The importance of an item depends, of course, on the use we make of it. In the case of industry, our water use requirements fall into two categories — sanitary use and industrial use. Generally, only a small portion of the water used by industry is sanitary water — water for drinking or use in foods, water used in lavatories and showers and laundries. The great bulk of the water used by industry is that used in the process or operation involved — industrial water. The largest single industrial water use is for heat exchange. We can use untreated seawater for this purpose, because while temperature and scale- or corrosion-producing tendencies are important quality factors here, the matter of dissolved solids, of color, odor — or disease-producing bacteria are of little significance. Our Dow plant at Freeport, Texas, uses one million gallons per minute of seawater, while its fresh-water needs are only 5% of this figure — 50,000 gallons per minute.

The most expensive industrial water is boiler feed water. At Midland, the 3,500 gallons per minute we use costs us $600 per million gallons. Where condensate is almost completely returned, the unit cost of boiler water is just as high, but the total cost may be small compared with total water cost.

Another heavy industrial water use is to keep things clean. Any industry must have wash water if it wants to keep a clean plant and to make a clean product. Many raw materials must be washed, intermediate products must be cleaned and floors hosed down. Fire protection is another vital need. As you may know, most industrial water systems are built on the basis of providing adequate supply and distribution of water for fire protection.

Every industry has its own special uses for water and all of them are important to that

industry. We in the chemical industry, for example, use water in a great many ways — for condensing and cooling, to transport materials from one step to another, as a solvent, to remove product or impurities, as a reacting agent, to dissolve salt, to quench molten slags, to scrub vents, as a carrier for emulsions, to wash floors and equipment, and for countless other things. This all adds up to enormous quantities of water used.

Like almost every industry, we have another vital use for water. This is the need for dilution of our waste streams, in order to prevent damage to other values. Edward Cleary, executive director and chief engineer of the Ohio River Water Sanitation Commission, has a brief poem on this subject:

"The solution
To pollution
Is dilution."

Even in the poetic form dear to Ogden Nash, we have a great truth expressed here. Industry's growing waste problems require an expanding volume of water if we are to cope with them.

Water is the very life blood of industry. We must have it to build a plant, we must have it to survive and we must have more of it to expand. It is self-evident that the conservative use of such a vital commodity must be a prime aim of industrial management.

This brings me to a second topic — the effect of water availability on community development through industry. I would like to make two points — first, that the development of industry is not necessarily governed by the availability of boundless amounts of good water, nor, for that matter, by a scarcity of water; and second, that we in industry and the leaders of our communities and municipalities must develop better ways of providing for our long-range water needs.

The location of a plant is dependent on many factors — upon availability of raw materials, power, distance from markets, transportation facilities and a satisfactory labor supply, among other things. The existence of a good water supply is a major factor, of course, but not a dominant one. We have a part interest in a plant located on Lake Superior, for example. If ever you wanted a good water supply, it has it — cool, clear, colorless and in unlimited quantity. But its distance from the market, and these other factors I've mentioned, have been a serious deterrent to growth. The Upper Peninsula has a fabulous supply of good water, but little industry, and in consequence little community development.

An opposite case is that of Arizona, where industry has grown remarkably in recent years owing to the climate and to the existence of a good labor market. The scarcity of water has not been a serious barrier to this development. However, we should note that none of the industries that have grown up in Arizona are wet-process industries — industries requiring a large supply of water. Actually, the location of industrial plants and housing on Arizona agricultural land is an advantage in respect to water use, because the demands for irrigation water far exceed the demand for urban or industrial water.

In view of the existence of these apparent anomalies — industry expanding in arid Arizona but stifled in the upper reaches of our water wonderland — the important thing, it seems to me, is to analyze our water resources more carefully, and to develop industries only in those areas where their needs will be compatible with the water resources. Such an analysis must, of course, take into consideration the needs of the community which grows up around it as it develops.

The public authorities are increasingly anxious to encourage industrial development in their domains and may tend to overlook the long-range strain on the water resources which may be brought about by industrial development. So it is incumbent upon us in industry to look ahead where others may not — both for our own protection and for the protection of the communities in those places where our growth takes place.

You are perhaps aware that in many places community growth has already exceeded the water resources of the area. The water supply of Flint, Michigan, is known to be in a precarious position, for example. I am told that Indianapolis is also in such a position and that Kalamazoo valley is approaching it. Chicago has a plentiful supply of water, but faces a serious dilution problem and is asking permission to divert more water from Lake Michigan for this purpose.

I mentioned the need for closer cooperation between industry and our municipal and other governmental officials in water use planning. Too often, I think, our political leaders become enthusiastic about industrial payrolls without providing for the orderly development of services to meet the needs of an increased population. This spells trouble.

Our industrial leaders must be extremely careful to weigh the full impact a new industry will have on the water resources of an area. This means industry must consider not only the water it needs for its own use and for waste dilution, but those of the people it attracts and the community that develops. The need for serious planning on these questions, in concert with municipal or other authorities, is obvious. With-

out such planning, without orderly development, we inevitably will find ourselves on the horns of a tragic dilemma; industry faced with reducing its production in order to release more water to meet the needs of the people, this meaning fewer jobs for the people who depend on the industry for their livelihood. Either way, people are hurt, because someone failed to think ahead.

Another major consideration of industry in respect to the community is that of waste water disposal. Industry must not fall into a trap in this respect when it locates a new plant. It must explore the situation with the state water resource agency, draw up careful estimates of the receiving capacity of the stream into which waste water is released and make a thorough study of water uses upstream and downstream, among other things. If these precautions are not taken, the plant is apt to become the object of political recrimination later, especially if pollution of the stream becomes a problem. And, of course, politics is no solution to pollution.

This brings me to my third topic, the effect of water-use laws on present and future industrial development. An expert on canon law has estimated that we now have some 35 million laws on the books which try to enforce the 10 commandments. Our water-use laws fall into this category, I think, my point being that what we need is not more laws, but more water.

At present, we at Dow have production plants in about a dozen different states, scattered from Connecticut to California, all operating under different water-use laws and doctrines. I would like to make clear that our plant developments have not been hampered in any major way by water-use laws. My chief criticism of the present laws is the anguish caused by differing interpretations in differing jurisdictions.

For example, the Eastern states' Riparian Doctrine has apparently permitted the development of industry with little conflict. My understanding of this doctrine is that it gives the riparian owner the right to use all the water he wishes, so long as he returns it to the same stream "undiminished in volume and unimpaired in quality." This is tantamount to saying, "Certainly you can go swimming. But don't go near the water." Another confusing issue, in connection with the common law, is the interpretation of "reasonable use." What is considered reasonable in one jurisdiction may be far from reasonable in another. Furthermore, where we have competing uses for water, the phrase "reasonable use" is not definitive enough to prevent misuse. From these roots stems the current movement in favor of water-use laws which would be definitive, and which would be superimposed on the common law.

Perhaps it would be helpful to your understanding of the effect of water-use laws on industry for me to cite a couple of cases in which my company has been involved. One halted a development, and the other did not. In the first case, we filed a request to discharge brine into the Ohio River. The administrators of the law refused our application, because they felt it wouldn't leave room for anyone else. In other words, they felt someone else, or many others, would come along with similar requests, which they would then be obliged to approve if they accepted the Dow request. We knew this was highly unlikely — and it hasn't happened in 11 years — but their conservative attitude did stop our development of what we considered a highly attractive plant site.

Certainly it was not the intention of the law, nor of the administrators, to stifle industry, but the ultraconservativism that was reflected did have this effect in this case. Was this in the public interest? I think not. I do think that the public good should be the basic consideration in the drafting of such laws, and that industry should have a voice in these matters.

The second case involves a plant near the mouth of the Saginaw River which we are just beginning to operate. To take care of our water needs we had first to have a permit from the U. S. Corps of Engineers to dredge, so that we could install an intake. Then we had to comply with an "order of determination" by the Water Resources Commission for effluent disposal. This worked out successfully. Our friends at the Consumers Power Company across the river did not protest, although their water will be warmer, though only by a "reasonable" amount. Only one citizen objected. It developed that his real goal was to sell us a subdivision which he couldn't sell to anyone else. Fortunately the laws are not written so loosely that this had to be taken seriously into consideration, and we have now begun operations.

Most of the new laws being written propose to "freeze" present usage of water and to require permits for additional use. A state agency would ration the various uses during drought seasons. The expanded use of irrigation in certain areas has created the greatest opposition to this policy, I believe. It would seem that the riparian doctrine should control this, but apparently it is not applied by those who are damaged. By and large, I think industry is not interested in rationing an item in short supply, but is most deeply interested in making certain there is enough to go around in a given area, even in drought-flow periods.

I have now arrived at my last topic, the question of how much can be gained in industry by applying water conservation measures. In doing some research on this subject I was surprised

to discover that we in the United States have more capital invested in transporting water than we have in all our railroads combined. This may be one reason water is not cheap, even though it is our cheapest raw material, with the exception of air.

At our plant in Midland we have tried to look at the total water picture. The intakes, the distribution mains, the sewers and the treatment plants are all necessary for the use of water. Rather than amortize this investment against general factory expense, we have charged this to the water-using departments in proportion to their use. This was one of the best water conservation measures we ever adopted. After the air had cleared, we found our high-pressure water use reduced by two billion gallons per year, and this translated into a savings in pumping and distribution costs of more than $76,000 yearly. In addition we now find that we can build more plants in a given area without water main or sewer expansion, thus affording incremental savings.

We speak of consumptive and nonconsumptive uses of water by industry. Quite frankly, I see some, but not much, chance for saving on the consumptive uses in industry. The water we sell as part of a product is well defined and usually expensive. If all of our water at Midland were recycled continuously, we would have a consumptive use of five million gallons daily. The cooling tower is a consumptive use of water due to evaporation. If we did not recognize the cost of this water, and the factor it becomes in our product cost and consequently in our profits, we would not last long in our jobs, and our places would be taken by persons who do recognize the economic facts of life. I strongly suspect that most of us in industry have made and are making serious efforts to keep our water use to a reasonable minimum, and that there is precious little room for improvement. We are, of course, always studying new ways to do things, and some of these new ways may involve less use of water. I seriously doubt that any such savings would or could contribute substantially to the over-all water problem.

In some cases, we even encourage the use of water, although this is the exception. For example, our plant psychologist tells certain of our employees that it is all right to drink like a fish, so long as you drink what a fish drinks.

Summary

Industry is a large user of water. The importance and expense of water demands careful, conservative use of it. Limited water availability does not necessarily preclude industry, nor does an abundant supply guarantee it.

Water-use laws have not restricted industry to a significant extent up to now, although some of the newer laws do threaten to restrict growth through over-conservatism. What industry needs is not more laws, but more water.

Some economies can be effected by in-plant water conservation measures, particularly in plants where such measures may not yet be in effect. One of the best measures, both for industry and for all other users of water, is to place a real value on the use of water.

We as a nation have a rather wasteful attitude towards water. Our rising standards of living and of sanitation appear to have led us into this dilemma; on the one hand we want to use more water and on the other hand we want to save more.

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PREDNAMIN

in the treatment of BRONCHIAL ASTHMA

• HARRY SWARTZ, M.D., F.A.C.A.
Chief, Allergy Department
New York Polyclinic Medical School and Hospital

The purpose of this study was to determine the clinical efficiency of a new combination drug in the treatment of bronchial asthma. The combination, Prednamin,® contains prednisone, chlorprophenpyridamine maleate and ascorbic acid.

The corticosteroids have proved a most effective class of drugs for adjuvant therapy in bronchial asthma. However, even the newer modifications of these drugs in high dosage or prolonged use are known to produce undesirable side effects, some of serious moment.[1] Nevertheless, in those patients with bronchial asthma responding partially or not at all to specific therapy, bronchodilators, mucolytics and sympathomimetics, the use of corticosteroids is practically mandatory. The problem faced in such situations is obvious. Were it possible to potentiate small doses of corticosteroids, the risk of prolonged usage would be greatly minimized.[2]

Although antihistamines per se are notorious for their failure to effect symptomatic relief in bronchial asthma, their capacity to reduce allergic edema, in small doses, is well known. There are certain antihistaminic agents that generally do not induce untoward reactions of any severity.

Ascorbic acid replenishes the adrenal cortex depleted during the stress periods of asthmatic paroxysms. Mitigating stress, this action of ascorbic acid permits the organism to mobilize more efficiently its own forces in its struggle for equilibrium during an allergic reaction.

Methods and Materials

Fifty patients (25 males and 25 females) with bronchial asthma comprise the subjects of this study. These patients were selected on the basis of the following criteria: (1) one or more years of specific therapy based on a complete allergy investigation; (2) partial or no control of symptoms despite such therapy; (3) unsatisfactory response to the usual adjunctive drugs, as epinephrine, ephedrine and aminophylline in their various forms. (Classed as unsatisfactory response were not only failure of therapeutic result but also marked side effects of epinephrine or ephedrine, as tremor, nervousness, palpitation and/or the need for frequent intravenous administration of aminophylline.)

These patients ranged in age from four to 69 years and the duration of asthma from one to 40 years. Twenty-one of these 50 patients suffered from one or more of nine different complications, purulent sinusitis being the most common.

Based on the presence or absence of bacterial allergy, the total group was divided into three categories; extrinsic asthma, intrinsic asthma and combined asthma. There were 17 patients with extrinsic asthma in whom inhalant and ingestant allergens were the etiologic agents, no evidence of bacterial allergy being present. There were seven patients with intrinsic asthma in whom there was no evidence of etiologic allergens other than bacterials. The combined asthma group was composed of 26 patients in whom both bacterial allergy and allergy to inhalants and ingestants together were the etiological base for symptoms. The types of asthma and characteristics of the groups are noted in Table I.

The study was begun during the first week of September, 1958, and thus for many was carried through the major part of the ragweed pollinating season. Since in 14 of the 43 patients comprising the combined and extrinsic groups ragweed pollen was implicated as an important etiologic factor, a particularly demanding condition prevailed in the test of efficacy of Prednamin.

The dosage of this combination varied from one-half tablet t.i.d. in the younger age groups to one tablet q.i.d. in adults. Although some patients required increase from initial dosage for effectiveness, few demonstrated tolerance by losing effectiveness at one level of dosage

®Combination of 2.5 mgm prednisone, 2 mgm chlorprophenpyridamine maleate, 250 mgm ascorbic acid per tablet was supplied by Dome Chemical Co.

TABLE I.
ANALYSIS OF 50 ASTHMATICS AND THEIR RESPONSE TO THERAPEUTIC AGENT (BY GROUP)

Type Asthma	No. of Patients	Age Range	Yrs. Asthma	Sex M	Sex F	COMPLICATIONS: Sinusitis	Hay Fever	Eczema	Allergic Dermatitis	Emphysema	Menopause	Myocarditis	Caries	Emotional Instability	RESPONSE: Dosage Daily Range	Days Rx	Time Lapse	Duration of Relief	Side Effects	Results: Excellent	Good	Fair	None
Combined	26	10 to 61	2 to 40	14	12	3	1	1	1	2	2	1	1		½ Q.I.D. to 1 Q.I.D.	3 to 30	1 to 3 days	While on drug	4	15	5	3	3
Intrinsic	7	49 to 68	4 to 13	3	4	3					1		1		1 Q.I.D.	18 to 30	2 to 3 days	While on drug	2	0	2	1	4
Extrinsic	17	4 to 69	1 to 25	8	9		2	1						1	½ Q.I.D. to 1 Q.I.D.	4 to 30	1 to 3 days	While on drug	2	15	1		1
Total and Averages	50	4 to 69	1 to 40	25	25	6	3	2	1	2	3	1	2	1	½ Q.I.D. to 1 Q.I.D.	3 to 30	1 to 3	While on drug	8	30	8	4	8

and regaining it at higher levels. The drug was given continuously from three to 30 days. (It was withdrawn from two patients, one after three days, another after four days because of side effects). Except for hyposensitization none of the 50 patients received other adjunctive therapy.

Results of Treatment

Table I summarizes results of treatment in each group. Table II presents percentage results. The results were best in the extrinsic group: excellent in 15 of 17 (88%), good in one (6%). The one in whom there was no response was a patient with marked emotional instability and a tendency to hyperventilate. The associated hay fever in this group also responded to the drug. The one patient with eczema noted a marked decrease in pruritus and a diminution in the size of affected areas.

The combined group showed excellent results in 15 of 26 (58%) and good results in five (19%). Two of the three patients who had no effect from the drug discontinued treatment after three and four days respectively because of side effects. The other, a 54 year old female with menopausal symptoms had no side effects after 18 days on one tablet q.i.d. Her lack of response is difficult to explain. One patient with mild emphysema no longer experienced dyspnea on exertion while on the drug. Another patient with more advanced emphysema obtained only mild amelioration of dyspnea and only a fair result in regard to his asthma.

The intrinsic group showed the least response to the drug. Only two of the seven (29%) obtained good results. Four (57%) had no results at all and one had fair results. These were largely older age group patients (49-68) who, in general, responded less well to specific therapy than the patients in the other two groups. Proportionately there was far more complication in this group than in the other two. In three there was an active purulent sinusitis for which no treatment was given.

For the 50 patients as a whole, the drug was actively effective in 38 (excellent and good) or 76%. This agent was least effective in the in-

TABLE II.
PERCENTAGE ANALYSIS OF RESULTS

Type Asthma	Excellent	Good	Fair	None	Side Effects
Combined	58	19	12	12	15
Intrinsic	0	29	14	57	29
Extrinsic	88	6	0	6	12
Total Group	60	16	8	16	16*

*Comment: Only 2 patients (4% of total) with side effects severe enough to require withdrawal of drug.

TABLE III.
THE EIGHT NO-RESPONSE PATIENTS

Type Asthma	No. Patients	Complications	Side Effects	Other Pertinent Data
Combined	1	Purulent Sinusitis		
	2	Purulent Sinusitis	Vertigo	Drug withdrawn after 3 days
	3	Purulent Sinusitis	Severe headache	Drug withdrawn 4 days
	1	Purulent Sinusitis	Nervousness	
Intrinsic	2	Menopause		
	3	Purulent Sinusitis	Headaches	
	4	Purulent Sinusitis		
Extrinsic	1	Emotional Instability		Diagnosis in question

trinsic group that showed most evidence of active sinus infection. It was most effective in the extrinsic group, 94% obtaining excellent and good results. In this group there were the fewest complications and no evidence of infection. The combined group found its place between these two with 77% showing excellent to good results.

Table III is an analysis of those patients who showed no response to the medication. The three patients in the combined group all had purulent sinusitis. This was also true of three of the four in the intrinsic group. The other patient in this group suffered from marked menopausal symptoms. The one patient who showed no response in the extrinsic group suffered from severe emotional instability and hyperventilated easily. It is interesting to note, in passing, that in this small group of eight with no response are included four of the eight patients with side effects and, of these, two were the only ones in the total group who required withdrawal of the drug because of severity of the side effects.

Time Lapse

In every instance, the drug was used continuously and not for the individual attack. One to three days elapsed before the full therapeutic effectiveness was established.

Side Effects

Although several side effects occurred, including vertigo, headache, nervousness and pyrosis, in only two patients were these of great enough severity to require withdrawal of the drug. Both of these patients were in the combined group and had purulent sinusitis. One experienced severe vertigo; the other severe headache with hypomania. Both of these represented without question steroid effects. The pyrosis seen in two were probably due to the ascorbic acid, a symptom not infrequently encountered following large daily doses of ascorbic acid. The other four patients with nervousness or headache were probably also experiencing mild steroid effects. The over-all incidence of side effects was 16%, 12% mild and not interfering with continuation of drug and its effectiveness; 4% severe requiring withdrawal of the drug.

Comment

In evaluating the clinical effectiveness of this drug no comparison studies, as such, were made. However, since the entire group of patients studied had been on a variety of adjunctive drug therapy in the past and their general ineffectiveness or difficulty in administration noted, this was considered as constituting some measure of experimental control. Among these patients, the attack frequency and characteristics varied greatly before institution of this therapy. Some experienced daily short episodes of wheezing, others nightly, severe and prolonged full-blown asthma. Still others had irregularly spaced attacks of varying severity and incapacitation. Many, therefore, had required frequent emergency intravenous aminophylline, subcutaneous epinephrine, or aerosolization with sympathomimetics. All of these measures were obviated or greatly diminished while on this medication. This has been the experience of others when introducing maintenance prednisone as adjunct therapy.[3]

The maximum dosage of prednisone used was 10 mgm as represented in one tablet q.i.d. Others[4] have indicated that a 10-20 mgm prednisone maintenance dosage was adequate for the control of responsive severe asthma. The lower figure reported in this study was probably made possible by the potentiating or auxiliary action of the antihistamine and ascorbic acid in the combination, and also by the antistress action of ascorbic acid.

Conclusions

1. Prednamin is a useful, long range, low dosage corticosteroid combination drug for bronchial asthma.

2. It is most effective in bronchial asthma in which infection plays no role.

3. The average effective dose is one tablet q.i.d.

4. At this dose there are relatively few side effects of moment.

5. The usual time lapse between institution of the drug and therapeutic effectiveness is one to three days.

6. There is little evidence of tolerance to the drug.

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L. Tanquerel des Planches, M.D.

1809-1862

A Historical Review of his Classic Masterpiece on Lead Diseases

• ROBERT T. LEGGE, M.D.
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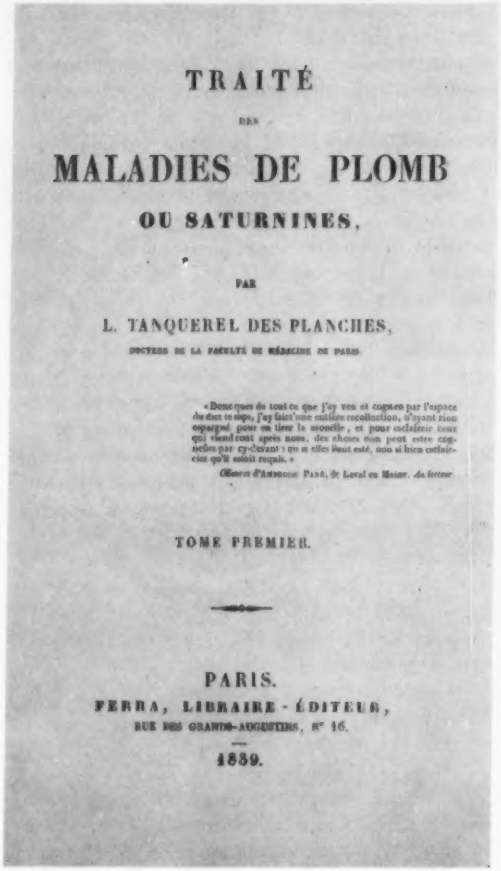

TRAITÉ

DES

MALADIES DE PLOMB

OU SATURNINES,

PAR

L. TANQUEREL DES PLANCHES,

DOCTEUR DE LA FACULTÉ DE MÉDECINE DE PARIS.

« Donc que de tout ce que j'ay veu et cogneu par l'espace de dix ans, j'ay faict une entière recollection, n'ayant rien espargné, pour en tirer la moyelle, et pour esclaircir ceux qui viendront après nous, des choses non peut estre cogneües par cy-devant : ou si elles peut esté, non si bien esclaircies qu'il estoit requis. »

*Œuvres d'*AMBROISE PARÉ, de Laval en Maine. *Au lecteur.*

TOME PREMIER.

PARIS.

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1839.

One hundred twenty years ago there appeared on the horizon of the medical world a French physician, L. Tanquerel des Planches, of the faculty of medicine on the clinical staff at the Hospital of Charity in Paris where he published the results of his investigation on lead diseases. This remarkable investigator, whom Alice Hamilton called the "Columbus of lead poisoning," recorded 2,171 cases of lead diseases at the Hospital of Charity after eight years of meticulous clinical observations, plus careful occupational histories and clinical analysis.

In studying the etiology of these cases he made numerous experiments on animals and performed many autopsies on deceased patients who succumbed to lead disease. He was familiar with medical history and with the writers of the past on lead poisoning. Dr. Tanquerel began his inquiries in 1831. Three years later he published a thesis on lead paralysis and finally, in 1839, published the two volumes of his classic masterpiece entitled *Traites des Maladies De Plumb on Saturnisms.* This work was crowned with the Montyon prize of 6,000 francs awarded by the Royal Academy in 1841 as being the best work in extending medical knowledge and for diminishing the danger of contamination associated with certain trades in the mechanical arts. Tanquerel was a real scientist, preferring truth before all else; a prerequisite of the true investigator.

He classified lead diseases under four well determined forms: colic, arthralgy, paralysis and encephalopathy. These affections have independent existence and have no real or necessary relations except those of their common origin, yet they may coexist. Of lead colic, this being the most frequent and best known, he numbered 1,217 cases, arthralgy 750, paralysis 127 and encephalopathy 72 cases. He carefully described the primary effects of exposure and absorption of lead dust by the respiratory and digestive organs. The first characteristic manifestation is the leaden discoloration of the teeth and gums. He explained that this was due to sulfureted hydrogen evolved in the mouth combining with the circulating lead in the tissues. Priority for the recognition of this sign is due him and not to Burton. Another commonly

described effect is the lead taste, breath and odor. The third item was lead jaundice, the results of the accumulation and absorption of great quantities of lead particles which produce this earthy yellow color of the skin and tissues. The fourth is lead emaciation.

He cites the various names given in the past by authors regarding this oldest occupational disease such as plumbism, saturnism, huttenkatze and colica pictonum. He well portrayed how lead is disseminated in the atmosphere as fine particles and how emanations inhaled or swallowed are absorbed by the mucous membrane, transformed into oxides or salts that produce the lead diseases. He was definitely satisfied that lead colic is not produced by cutaneous absorption. As to the 1,217 cases of lead colic observed, every individual had an occupational history as a worker in lead. The principal ones were red and white lead makers, painters, grinders, potters, type and bronze workers. He devoted a chapter to predispositions such as season, climate, age, sex, cleanliness, etc., and another to precursors of the phenomena of primary effects that precede lead colic.

Lead Colic

Beginning with lead colic, he devoted chapters to definitions, synonyms, history, causes, predispositions, precursors, symptoms, complications, progress, diagnosis, chemistry, seat and nature, and last, treatment. The other three lead diseases were likewise arranged.

The symptoms of lead colic, as is implied, are severe pain principally located about the umbilicus, often in the epi- or hypogastrium, of a violent, moderate or light degree. He mentioned that the rigidity and depression of the abdomen and the relief of the colic pain by pressure is achieved in seven out of 10 cases. The nausea and vomiting, the contractions of the anus and rectum, borborygmus, hiccough, characteristic breath, saliva, metallic taste and jaundice are familiar symptoms.

In the differential diagnosis of other diseases of the digestive organs, provided by such metallic poisons as copper, mercury and arsenic, he described how the symptoms differ from those of lead action, also of such pathological conditions as ileus, peritonitis, nephritic and hepatic colic. Tanquerel performed postmortems on each of the 49 patients who died of lead colic. There were found no alterations in the digestive tube and only traces of congestion. Such pathologists as Merat, Orfila, Grisolle and Dehaen concur in that they had not been able to discover the slightest traces of inflammation in patients who have died of lead colic. It was Tanquerel's opinion that the seat and nature of lead colic is in the great sympathetics and nowhere else.

Lead Arthralgy

Lead arthralgy is credited to an affection of a neuralgic nature produced by lead and characterized by lively pain in the limbs, lacking redness or swelling, diminished by pressure and increased by motion. It is accompanied by various difficulties, such as cramps, hardness and tension of the painful parts. Next to colic it is the most frequent effect. Lead arthralgy usually accompanied colic, paralysis and encephalopathy in Tanquerel's cases.

He defined paralysis in general as the loss or weakness of voluntary motions and sensibility, or of one of these faculties only. One of these states he termed paralysis and to the other he gave the name of lead anesthesia. Tanquerel made the statement that lead workers most frequently attacked with paralysis are those confined in an atmosphere contaminated by lead emanations. Forty of 108 cases did not have a preliminary colic. Certain symptoms give notice of the approach of lead paralysis: lassitude, trembling, weight loss and coldness. Ninety-seven cases were affected in the upper extremities, mostly in the wrist, forearm and fingers. In 15 cases, paralysis developed in the thigh, leg, foot or toes. A few cases showed paralysis of the intercostals and vocal cords. Paralysis is one of the gravest diseases caused by lead. Of those who died, the autopsy findings, as to the appearance of the cord, spinal marrow and muscles, revealed no evidence of anatomical alterations which would account for the phenomena of the disease. The muscles most frequently deprived of motion are found in the extensors of the limbs. No morbid phenomena have been observed in the central nervous system; which indicates the existence of an organic lesion as the origin of lead paralysis.

Lead Encephalopathy

Lead encephalopathy was known first by Dioscorides, the Greek physician of the first century A. D., who mentioned the delirium produced by lead. Symptoms came on suddenly, with violent cephalalgy, often limited to the forehead, usually accompanied by vertigo or amaurosis and pains in the orbits. Different functional derangements of the brain such as delirium, coma and convulsive forms frequently developed. Of this series of 72 cases, 16 died. At the autopsy there was found a flattening, a shrinking of the cerebral convolutions with increase or dimunition of cohesion of the cerebral pulp.

Tanquerel recognized the value of chemical analysis by availing himself of the services of Devergie and Guibort who detected a notable quantity of lead in the brain tissues in encephalo-

pathy. Subsequently, Devergie in 1836 detected copper and lead in normal human organs. This was confirmed by Orfila, the Parisian toxicologist. Professor M. D. Chevreul, the father of organic chemistry, pointed out as early as 1824 the existence of copper and lead in the human body as normal elements. This finding is of the greatest importance in legal medicine.

Prevention and Treatment

The final chapter of this great work is devoted to the prevention of lead disease by hygienic measures, both personal and environmental. He especially emphasized avoiding inhalation and ingestion of lead emanations. He stressed personal cleanliness by baths, washing before eating, by mouth hygiene and clean clothing. He also developed a respirator in which a dampened sponge fitted over the nose and mouth. He promoted clean working places, good ventilation and wet processes to avoid dust. As for therapy, he had no specific, only symptomatic methods. He discredited the use of the popular sulphuric acid lemonade, extensively used at that time.

Tanquerel des Planches' immortal books on lead diseases earn for this astute clinician and investigator a foremost place in industrial medical history.

Since few copies of Tanquerel's book on lead poisoning are available anywhere, it is noted that these were translated into English in 1848 by Samuel L. Dana, M.D. under the title *Lead Diseases*. This same book contains the results of Dana's own investigation of lead poisoning from lead plumbing. This Dana publication is almost as rare as the Tanquerel volumes, but at least the American readers possess the virtue of having a good translation into English.

Occupational Cancer

Repeated sunburn is perhaps the most widespread of the known causes of cancer.

"The belief that nothing is known about the causes of cancer is as mistaken as it is universal," says Charles S. Cameron, M.D., former medical and scientific director of the American Cancer Society.

"A great deal is known," he continued, referring to certain circumstances or agents which appear to favor the development of cancer. "Although we do not know how or why."

"Sunburn, for instance." he remarked, "The connection between the disease and sunlight is so striking that long ago cancer of the skin was dubbed 'sailor's cancer' or 'farmer's cancer'."

A large number of rats, in an experiment, placed in the sun for several hours a day over a period of months became cancerous. Nine out of 10 developed cancer of the skin and always in areas that were exposed and sparse in hair.

"Very fair-skinned people in particular must be careful," warned Dr. Cameron.

He also mentioned other suspects that contribute to the danger of cancer. "Modern men and women who live in cities inhale a rich variety of smoke, dust and fumes. Roads and streets are covered with asphalt which is chemically related to substances that are known to cause cancer," Dr. Cameron said.

Occupational hazards such as those that exist if a human being is working with dyes, arsenic, tar, creosote oil, crude paraffin oil, x-ray and radium, can, if the contact is long enough and intense enough, result in skin cancer.

It must be remembered, Dr. Cameron stated, that these agents are dangerous in causing occupational cancer when the form and amount handled are taken into consideration.

"Finally," Dr. Cameron said, "the known and suspected causes of cancer do not account for the majority of cancer cases. Evidently a more basic cause lies within the living organism itself. The nature of susceptibility is unknown but it is the core of the cancer problem."

—From *Whittier* (Calif.) *News*, July 1, 1959.

Symposium . . .

THE MANAGEMENT OF PEPTIC ULCER

- CLIFFORD J. BARBORKA, M.D.
- G. GORDON MCHARDY, M.D.
- RICHARD D. MCKENNA, M.D.
- EARL E. BARTH, M.D.
- WALTER W. CARROLL, M.D.
- JOHN M. DORSEY, M.D.

A Panel on "Problems In The Management of Peptic Ulcer" was convened at the Drake Hotel, April 17, 1959, as a part of the program of the American Association of Railway Surgeons. Clifford J. Barborka, M.D., Chicago, Illinois, was the moderator. The panel included:

G. Gordon McHardy, M.D., New Orleans, Louisiana, Associate Professor of Medicine, Louisiana State University of New Orleans and Browne-McHardy Clinic, New Orleans;

Richard D. McKenna, M.D., Montreal, Canada, FRCP and FACP, McGill University, Montreal, Canada, Assistant Professor of Medicine and Clinical Medicine, McGill University;

Earl E. Barth, M.D., Chicago, Illinois, Professor of Radiology, Northwestern University Medical School;

Walter W. Carroll, M.D., Chicago, Illinois, Associate Professor of Surgery, Northwestern University Medical School;

John M. Dorsey, M.D., Evanston, Illinois, Professor of Surgery, Northwestern University Medical School; Chief of Surgery, Evanston Hospital.

CLIFFORD J. BARBORKA, M.D., MODERATOR: I think that most of us, in discussing the problems in the management of peptic ulcer, are fairly willing to accept a certain regimen which has not altered greatly, I regret to say, in many years. I think that most of us recognize that with the use of rest, diet, antacids and sedatives probably 90% of the cases that come to us with ulcer will respond adequately.

I would like to emphasize, before we go into the problems of peptic ulcer and particularly the problems of the differentiation of the benign from the malignant gastric ulcer, one factor that I believe needs attention. Often we fail to recognize the importance of educating the patients with duodenal ulcer by impressing upon him the importance of preventing recurrence. If we fail to do this, then we are missing our responsibilities.

My personal feeling is that if we do not take almost the same attitude toward the responsibility of educating the peptic ulcer patient as we do the diabetic patient, that we are doing a disservice merely by controlling that patient's symptoms. If we get recurrence, then we subject that patient to the likelihood of the necessity for surgery.

There are many documented observations on recurrences but few well documented, well handled surveys of adequate number to be of statistical significance. We do, however, find some significant factors which, briefly, are these:

In free clinics, where too often there is the negligence of a close doctor-patient relationship, there is a recurrence rate in the duodenal ulcer of 80% to 90%; whereas in the careful surveys in well controlled doctor-patient relationships, in an educational sense, there is only a 30% to 50% recurrence.

As we get into the problems of the management of peptic ulcer, I would like to survey the panel for a moment on the factors responsible for recurrences. I would like to ask Dr. McHardy how he feels about the relationship of tobacco, alcohol and caffeine to the ulcer condition and recurrence problem.

G. GORDON MCHARDY, M.D.: On the tobacco question, I don't feel in a position to answer. Of course, from the physiological viewpoint we can demonstrate things associated with smoking. In my general concept of ulcer management, I would like my patient to stop smoking and, if he continues, to give him a reasonable interpretation of what might occur. If he feels there is recurrence of symptoms to any degree in connection with smoking, then it should be discontinued. I am not fixed on the idea, nor am I fixed on any concept of tobacco causing ulcer or ulcer reccurrence.

However, with alcohol, I think that the situation is a little different. I think that we all appreciate the fact that alcohol is a gastric

stimulant and it was part of a routine test over a period of years in connection with determining the presence of hydrochloric acid. I think that there is some definite indication that alcohol is a gastric stimulant and in a great number of circumstances, while it may relax patients in one way, it can also harm in another if used indiscreetly.

I have no fixed feelings about caffeine. I don't believe that I have been able to show any definite tendency to recurrency. On the other hand, there is the fact that coffee drinkers seem to have recurrence of their ulcers after a bout of coffee drinking. The individual who drinks coffee persistently over a long period of time will have a tendency to have some recurrence of symptoms.

Of these three factors, tobacco, alcohol and coffee, I don't think that any of the three can be blamed primarily for the recurrence or activation of ulcer.

If a part of the question was what I felt about the causes the recurrences, then I would say that physical and emotional stress is number one, dietary indiscretion is another and respiratory infections another, particularly when an individual has treated himself with stimulants. Those would be my three choices in connection with recurrence or reactivation of ulcer.

RICHARD D. McKENNA, M.D.: I cannot think of any reason to quarrel with Dr. McHardy's comments at all. I do feel, however, that alcohol, coffee and caffeine come under the same category. After all, caffeine is just as good a stimulant of the gastric juices or secretions as is alcohol.

With regard to tobacco, I feel that if an individual can stop smoking, then he is going to have an easier time healing his ulcer. If, on the other hand, in an attempt to stop smoking he becomes a nervous wreck, quarrels with his wife and children and becomes a miserable fellow around the house and in business, then I think that perhaps one should not insist too much on his stopping smoking.

Excessive smoking, after all, is often a symptom of nervous stress and tension and the two go hand in hand. Just which is the cart and which is the horse is a little hard to determine.

I certainly agree that the most common cause of recurrent ulcer is nervous stress, nervous tension, threat to security. I think that this is well established.

There is just one feature that I would like to get out for fear that we may not get back to it, and that is that I feel very strongly that what we often call recurrence after the disappearance of the symptoms is not really recurrence of the ulcer, but a recurrence of the symptoms in an individual who still has his ulcer.

I believe that it takes an appreciable amount of time to heal an ulcer — that we can, by and large, get our patient symptom free in from 24 to 48 hours and, if we cannot, then we might suspect that there is something wrong with the diagnosis of ulcer — and that it takes considerable time, two or three months, to heal the ulcer.

I also believe in radiologic control to determine when this ulcer is healed. I have seen people who have been free of symptoms on management for two months and we x-rayed them and found a nice big crater still there and insisted that management be even more rigid for the next two months.

BARBORKA: I would now like to get the reaction of the surgeons to the problems of recurrence. Dr. Dorsey, would you give us your reaction to these problems that we are now discussing?

JOHN M. DORSEY, M.D.: I believe that the most important therapy in connection with peptic ulcer is proper medical management. I do not believe that the use of alcohol, tobacco or coffee fits into that designation of proper medical management and therefore I would feel that continued or recurrent ulcer difficulty in the presence of the ingestion of any one of these three could be attributable to this, as well as nervous tension.

I therefore suggest, before I consider anyone for surgery, unless they are completely aware of the implications, that they have not had adequate medical management unless they have avoided these three agents.

WALTER W. CARROLL, M.D.: I can say that certainly my opportunities to interfere in a patient's decision regarding these particular factors are mostly postsurgical, and so surgeons certainly are interested in postsurgical recurrences in the same manner that medical men are concerned with the recurrence of the ulcer which has not come to surgery. Therefore, I would like to make some mention of these three factors.

I will refuse to operate upon a patient who has not stopped smoking at least for two weeks prior to surgery. This is for a number of reasons, the prominent one being pulmonary irritation.

After surgery I would like him to promise me he will not smoke until we give him the go-ahead signal and if our postsurgical studies indicate that his acid production has been reduced to the bare minimum, then I would like to have him limit his smoking to those times when he has recently ingested food — in other words, have an antacid mechanism present and let him enjoy his smoking on a full stomach.

The same goes for alcohol. After the patient has been operated upon, I like him to pass through a period of two or three months of adjustment to his new program and then if he wishes to add a cocktail that he has been de-

prived of, I will mention to him that he ought to take it shortly before eating and not make the cocktail hour too prolonged.

I am a little more against coffee perhaps than some of the others, although I partake of both. My experience is that coffee is rather irritating and it is the last thing that I would permit the patient to add to his diet.

BARBORKA: I think that these are good cross sections of opinion from both sides — medical and surgical. I think it stresses our present concept of the etiology of peptic ulcer in relation to acid secretion.

We recognize, from these discussions, that we have a definite nervous phase in relation to this problem of secretion.

We have the gastric phase in relation to the precipitation of the large gastric ulcers and we had at a conference not more than two or three weeks ago five examples of large gastric ulcers in arthritic patients without previous ulcer history, who had been treated with large doses of steroids. It emphasizes the effect of the stress phase and the steroids and adrenal factors.

I think that most of us are probably inclined to agree with the physiological concept showing the relationship of the effect of the removal of antrum on gastric secretion. Most of us, I am sure, will agree that the gastric ulcer is due to over-activity of the antral phase.

I think that we could go on all afternoon in connection with this particular point. I think that these points are practical and they are usually dependent upon the character of the individual subjecting himself to us for treatment of his peptic ulcer.

I know very well that during the 12 years that I was at the Mayo Clinic, 25 of the people on our staff had ulcers and 24 felt that they should pickle them and indulged in large amounts of alcohol. I would, however, go along with those on the panel who disagree with this procedure.

Now then, let's break into another important problem — the management of ulcer. Let's have a few words in respect to one of the complications, hemorrhage.

Dr. McHardy, when you are confronted with a case of hemorrhage what is your procedure?

MCHARDY: First, a patient with a massive hemorrhage is a hospital patient.

Second, I think that the first method of management is teamwork by the surgeon, internist and radiologist, all cooperating in connection with the evaluation of that patient. Dr. Barth has said that in the case of the patient with the massive hemorrhage perhaps the diagnosis is already made and thus the radiologist perhaps doesn't play as great a part on the team.

However, the purpose of teamwork in presenting this case is a cooperative consultation between internist and surgeon, whereby the management of the patient is watched over by both sides — the concept of management being that if this patient responds to blood replacement, supplied only as necessary, and the patient shows all clinical signs of cessation of bleeding within 48 to 72 hours, the patient is still continued on a medical program.

If the patient continues to bleed massively, despite all effort, especially within from 48 to 72 hours, then this patient is more likely a better surgical risk than if continued on a medical program.

The management of the patient, first, I think, is the management of shock. Therefore, if this patient's blood loss has been sufficiently great to require blood replacement, then this should be the primary factor in treatment.

We believe in placing a tube in the stomach of the patient, for two reasons. First, we feel that it is diagnostic; that it gives the bleeding site. Second, there is the advantage of emptying the stomach later.

We also feel that a person with a massive hemorrhage and in shock is in no position to start eating. We feel that the general management beyond this is one of sedation. We avoid the opiates because of their tendency to cause vomiting. I think that is the program.

BARBORKA: Dr. Carroll, when, in conjunction with your internist, you are confronted with the apparent necessity of surgery associated with hemorrhage, what is your procedure?

CARROLL: After a decision is made, the abdomen is opened and the pathology is in front of us, we find that gastric resection has been the most reliable single procedure agreed upon probably by everybody, up until the last six years or so.

In the course of this gastric resection, I believe that if possible the ulcer should be removed. If it is not removed, then at least it should be exposed, the vessel ligated and the duodenal cuff turned in. This is usually a difficult thing to do without actually excising the ulcer, and it has been our practice to try to take precautions to see to it that the bleeding point is controlled. The gastric resection, then, is the typical type of operation and this has been our procedure.

I would like to pass on something that I have learned in recent years but have not had enough experience with to give ample statistics. This is that a vagotomy is a much simpler operation than a gastric resection and, during the course of this operation, the ulcer can be visualized, the bleeding point directly ligated and the patient can be removed from the operating table in a relatively short time. I believe that if our patient was the type in whom the operating time was a consideration and this procedure

could be accomplished, it might be the easier approach. In other words, opening up the stomach, looking at the bleeding point and ligating the vessel is really going to be a part and parcel of your technique, and if the tissues are such that a vagotomy can be done, then I am sure that it might be a safer procedure in some instances.

BARBORKA: Dr. Dorsey, do you approach the problem of hemorrhage in any different attitude?

DORSEY: Essentially, no. However, I wanted to stress certain things about this hemorrhaging patient. I think that the preliminary history is extremely important and only if this is the first hemorrhage is this an acute ulcer. All of the background details should be gotten because I am sure that this will influence the judgment in each instance. If, for instance, we are dealing with an acute, first time situation, we are much more likely to be slow to operate upon that patient, except in the presence of definite indicating factors. The same thing applies in connection with an acute perforation, and here I really believe that the history leading up to hemorrhage is important.

The next thing is that even if history has not disclosed the fact of previous x-ray evidence of ulcer being present, and although the clinical picture is definite, I think that an early x-ray examination is important. Benign tumors causing a hemorrhage are discovered in that way.

It is important to know that we are talking about massive hemorrhage and what that means. It may mean the loss of enough blood to bring the hemoglobin down to seven grams, about two and a half million red cells, or an amount sufficient to require 2,500 cc of blood to replace the lost blood and bring that patient up to normal hemoglobin. That is a massive hemorrhage and when we are talking about that, then I think that we clearly can talk about indications for surgery.

If the patient has a gastric ulcer instead of duodenal, and if he is 50 years of age, then that patient is less likely to stop bleeding, and unless it has been shown that bleeding has been stopped by the replacement method, then the patient becomes a candidate for immediate surgery.

BARBORKA: Would both of you not be conservative and follow the conception or teachings of Finster if you saw some blood in the stool of a patient with ulcer?

CARROLL: If you will examine carefully Finster's startling report, and if you will talk to some of the men who interviewed some of his residents you would find that he had less than 5% mortality if you filled the documentation with the first time bleeders. However, if you took the second and third time bleeders and the people over 50 then you would have a different statistic. It was much higher in connection with the mortality rate.

We do not want to operate unnecessarily, but there are some factors which we must all keep in mind. As was pointed out, from the historical standpoint there would be certain things to consider. If this man was over 50, and if this had been a recurring episode; if, despite your treatment, the patient has had continuous pain during the bleeding episodes, then you have strong evidence that the patient has an active thick walled crater with posterior penetration into one of the branches of the superior pancreaticoduodenal artery and, undoubtedly, this is something that is not going to stop bleeding. With those people and with those factors in mind, the mortality certainly is higher, and the higher mortality comes from the postponement of corrective treatment.

BARBORKA: Dr. McKenna, what is your attitude toward feeding the patient with hemorrhage?

MCKENNA: Essentially, after your patient is out of shock, then I think that the medical management is the same as tnat of the uncomplicated ulcer. When the shock has been successfully treated and you feel that the patient can tolerate feedings, then we certainly believe in the use of hourly feedings for a neutralizing effect.

BARBORKA: I think that when we are confronted with perforations we are generally confronted with two or three different types. We have a free perforation, a penetrating type or one that has walled itself off. I would like to ask my surgical colleagues what their attitude is toward the perforations.

DORSEY: Again, I prefer to refer to the history. I think that the instituted treatment should depend upon how long this patient has had an ulcer. If it is an acute ulcer, then his history will bear it out and, in that case, my treatment is simple closure, particularly if it is a duodenal ulcer.

If there is a history of chronic duodenal ulcer and if the patient is a good risk and if the symptoms are caught early, then conceivably we could perform a gastric resection, although I personally prefer to do that as a secondary operation, at some time relatively soon after the closure. But as we get into the stomach and the gastric ulcer, then I think we encounter the patients who may have had a primary resection at the time of original surgery. That is the ideal patient with the perforation who can be resected, but generally speaking I feel that the most conservative, simple closure of the ulcer is the treatment of choice.

BARBORKA: I would like to get your reactions to the aftermath of your therapy for perforation. What can you expect that patient to anticipate?

What sort of program do you ordinarily give that man?

CARROLL: Let us assume that we have a man with the first perforation and a nonexistent history. He is certainly going to ask you the question, "What's in the future for me?"

I think that my story to this individual would be that he would have a likelihood of having some symptoms in the future, which would come from a recurrence of that ulcer.

He will then ask, "Well, how much trouble am I apt to have?"

My feeling is that if there were 100 such individuals whom I had to answer this question for, I would say that probably one-third of them were not going to have any trouble at all for the rest of their lives as far as their ulcer is concerned; that two-thirds of them are going to have some trouble which will require management and, of those, half will probably come to surgery for various complications of ulcer and the other half will be adequately controlled with medical management.

In other words, I would answer, "One-third of you are going to have no trouble; one-third are going to have a moderate amount of trouble and one-third are going to have bad trouble, which means that you will fall into the hands of the surgeon again."

BARBORKA: I think that is quite a significant statement and I think it is fairly true.

There is one point before I go on to the important problem of gastric ulcer. Concerning the side effects of steroids, what is your feeling, Dr. McKenna, about the use of steroids or the possibility of this complication?

MCKENNA: I am not thoroughly convinced that steroids do cause peptic ulcer. If they do, I do not think we understand the mechanism by which this occurs. On the other hand, we are faced with problems such as those mentioned by Dr. Barborka, and I think that other experimental work has shown possibly an explanation of this situation. Certainly in our arthritis clinic I have urged x-ray examination of the stomach in patients in whom steroid therapy was contemplated. We have found in patients who don't have any history of ulcer that an appreciable number of these people have either gastric or duodenal ulcers, and if these patients had not been x-rayed and put on steroids, these would have been called steroid ulcers.

Certainly there is experimental evidence that the penetrability of a gastric or duodenal ulcer can be increased by the use of steroids, but I am not convinced that they can produce a peptic ulcer and I do want to make a plea for the use of x-ray examination of the stomach, even though the history of ulcer is lacking, before the start of steroid therapy in the treatment of arthritis.

MCHARDY: I would like to say one word about the so-called nonsurgical medical management of patients with perforated ulcer. There are instances in which the delay in diagnosis, the inability to make a diagnosis, or the fact that the patient is a poor operative risk, will disclose an individual who can and should be managed by a so-called nonsurgical procedure with the surgeon in charge of the case preferably.

We have seen this in two ways in our area. First has been in the U. S. Public Health Service Hospital, where seamen who have perforated their ulcer were from three to seven days at sea before they arrived in ports. There is no particular point in operating on those individuals at the time they arrive at the hospital.

Second, a reasonable number of our indigents at the Charity Hospital, many of whom have been pretty well beat up and alcoholic, have perforated and the diagnosis wasn't made by the admitting officer. These people were usually on emergency service for alcoholism. We would see these patients sometimes not for 48 to 72 hours after the perforation had occurred. In such instances and in exceptional instances of bad operative risk, there is some virtue to managing these patients by so-called nonsurgical procedure. I think that this should be kept in mind. Occasionally you have a patient who refuses operation and that patient will quite often get well with nonsurgical management.

BARBORKA: Certainly approximately 10% of the gastric ulcers are apt to be malignant. I would like to hear my colleagues' reactions toward so-called trial management. I think that Sarah Jordon was one of the first to emphasize with careful statistical studies the justification of so-called trial management for a period of from three to six weeks. Dr. McKenna, what is your attitude toward subjecting the patient to trial management to determine whether this lesion is benign or malignant?

MCKENNA: I am against the use of surgery for treatment of all gastric ulcers because we then would have an uncommonly large number of people with unnecessary resections. On the other hand, one has to assume the responsibility of not only the making of the medical decision but also the responsibility of a very careful followup of the patients on whom a medical course has been decided upon. Sometimes, of course, this is a simple problem and sometimes a difficult one. In a simple problem, where one has a small or lesser curvature ulcer, you will certainly have a history of the x-ray appearance being benign and there is free acid from the stomach. Sometimes this is a difficult decision to make, but even in these people one must assume the responsibility of following them up very carefully.

In ulcers of the antrum, the decision becomes more difficult. The incidence of malignant ulcer is higher and it is a more difficult problem to decide, but I feel that where one cannot demonstrate a filling defect and where the appearance is that of an ulcer with possibly a little edema around it, in the absence of a history I believe that one should give these people a medical trial.

We have become more and more aware of the occurrence of ulcers on the greater curvature. We also must consider the benign versus the malignant and the problem of whether an ulcer has penetrated into adjacent organs. Not only the size, but also the depth and the base of the ulcer is a factor of importance. I don't feel that the question of malignancy is the only question to be considered.

Certainly not all benign gastric ulcers should be necessarily treated by medical means, but in general I am in favor of a medical trial where we have a reasonable assurance that we are dealing with a benign ulcer.

CARROLL: I have two questions. The first is what is the best operation for a chronic duodenal ulcer penetrating into the pancreas. I am sure that the arguments about this question would be few. It would be a gastric resection and anastomosis with a short loop and the resection should be a 70% resection. Times have changed a little bit and we are constantly trying to improve and to select a better operation for an individual patient. Therefore, my answer to this question would be that we should tailor the operation to the patient rather than trying to decide what is the best operation.

In this particular instance, for example, it might be that the signs of inflammation around this particular penetrating ulcer is such that the duodenum could not be mobilized and the common duct could not be visualized, and one would be risking a great deal of morbidity and the possibility of a duodenal stump blowout in such a case if one were to do a resection. Therefore, in that particular case I would specify a vagotomy.

The next question is, "What is the mechanism of the Zollinger tumor of the pancreas in hyperacidity and recurrences of ulcer after gastrectomy?"

There have been less than 30 of these patients in the literature to date, but it seems that every institution now has one since this discovery was made.

What has happened is that every once in a while a person has come along with an ulcer intractible even to good surgical care. The patient might have had as much as 80% resection and still the ulcer recurs. However, when the patient is explored and the pancreas examined, a tumor is found in the pancreas. If this tumor is removed the patients in the great majority of cases reported have had favorable results. Therefore, the question in this case has to do with the mechanism of this tumor. I think that it has to do with the endocrine system and must have some relationship to the production of a juice. In other words, it is a tumor that produces a secretion which, when absorbed into the blood stream, produces a hyperacidity.

DORSEY: My question is, "With the relatively poor results of carcinoma of the stomach, should not all gastric ulcers be operated upon?"

Surgery in the stomach, has been disappointing, but that does not bring us to operate upon all gastric ulcers because of them being benign and because there is a mortality associated with it. I think that we do kill a certain number of people with operations and, therefore, these people do have to be carefully screened.

MCHARDY: In relation to the medical management of, or trial management of, gastric ulcer, I think that the first requisite is that you have made a base line diagnosis of benign lesion and that you have accomplished a base line radiological finding. If your x-rays are not satisfactory, then they should be repeated within two or three days. If you have a baseline to start from and you are assuming that this is a benign lesion before you proceed, then you will find that is the end of your trial right there.

Now my question, "What do you do with an acute bleeding ulcer with no previous diagnosis?"

First of all, get an accurate history in order to give yourself some indication of the possible site of the bleeding. If you have isolated your bleeding to the upper tract and the patient is bleeding massively and is not a reasonable risk for much other than medical treatment, in order to get the patient out of shock, what procedures do we follow?

Possibly you can make a diagnosis of cirrhosis of the liver on that individual. If you do control the bleeding then you can aspirate the stomach with a balloon tube in place and keep the bleeding under control. To some degree this localizes the site of bleeding for the surgeon who will possibly have to come in.

Of course, the radiologist must be a consultant and must understand the problem and must also understand the risk of sending this patient to that department for examination. However, my first reaction to this type of patient would be to attempt to make a diagnosis clinically and then to try to stop the bleeding.

Here is another question: "How many times would you postpone surgery in a bleeding ulcer patient who bled repeatedly, if the patient is under 25 to 30 years of age?"

I was astonished to hear the surgical opinion

that age dictated to them when they operated on a bleeding patient. We have had as many deaths among the young bleeders as among the older bleeders and it is not unusual for an acute gastric ulcer almost to disseminate in a younger person. Therefore, I don't think that there is a great deal of difference in connection with the age factor.

If an individual has a massive hemorrhage from an undiagnosed lesion and recovers from that episode of bleeding and then on subsequent study the diagnosis is made either of gastric or duodenal lesion, then I think that this individual is a patient for surgery during a nonbleeding interval. After the first hemorrhage in an ulcer that has not healed medically, I think that you have enough indication for surgery. If, on the other hand, that ulcer has healed and now this individual bleeds for the second or third time from another lesion, then I think you might consider an exploratory operation.

I would prefer that he be explored and have active surgical management if he has bled more than once and has a chronic unhealing lesion or even if he has recurrent lesions.

BARBORKA: If a gastric ulcer is benign or malignant and this cannot be determined accurately prior to surgery, what is the criterion to bring your cases to surgery?

McHARDY: I would emphasize that every case of gastric ulcer that you are confronted with will not be malignant. I think that all of the factors that have been already discussed must be weighed carefully to determine the condition of the ulcer. We must not forget the morbidity of these individuals. Also, I think that this trial management period of from three to six weeks is a justified procedure and I urge that concept.

Blind as a Rat

How a lack of vitamin A causes night blindness, the earliest deficiency sign, has been established by the use of vitamin A acid, John E. Dowling and Dr. George Wald reported at the annual meeting of the Federation of American Societies for Experimental Biology.

The investigators, of Harvard University, said that one of the functions of vitamin A is to stabilize a protein, opsin, from which the body makes the visual pigment, rhodopsin, found in the retina.

Some years ago, Dr. Wald found that the vision pigments, which occur in the light-sensitive cells of the eye, the rods and cones, are made of vitamin A attached to a protein. In experiments reported by the authors a year ago, rats kept on vitamin A-deficient diets for prolonged periods developed the expected night blindness. It was found that the visual pigments, as well as opsin, the specific protein from which the pigments are made, were being lost from the retina. At the same time, there was a physical breakdown of the retinal tissue.

It was difficult to prove the cause-and-effect relationship of the opsin loss and the anatomical degeration, because by the time opsin is lost the entire animal shows signs of deterioration.

This relationship was established by the use of vitamin A acid, a form of the vitamin which apparently can maintain all body functions except vision. Rats kept on a vitamin A acid grew normally and seemed in excellent health. However, they became extremely night blind, more so than any animal kept on a simple vitamin A-deficient diet. In the animals on the acid form of the vitamin, it was found that all the retinal cells seemed perfectly normal except the visual cells, the rods and cones themselves, which had almost entirely disappeared. Direct measurements showed that such retinas lost all their rhodopsin, and most of their opsin. The researchers thus concluded that vitamin A is needed not only to make the visual pigment, but to keep opsin in the retina and to preserve the anatomical structures of the rods and cones.

They noted that the animals do not store any vitamin A acid, even when fed in huge quantities. No trace of vitamin A is found in the animals, as they apparently cannot convert the acid into vitamin A. If the same situation holds true for humans, this observation could have important medical implications. Because the body stores vitamin A, there is always the danger of overdosage when large amounts are given. If vitamin A acid can meet all the body's needs for vitamin A except in vision, the physician could use massive dosages of this form to treat short-term specific conditions.

The poetic genius of England's beloved William Wordsworth was little in evidence in his early adult decades. Then, for a few years, his flame of brilliance was mighty. Just at the time when the world awaited a poetic conflagration, Wordsworth's fire flickered to embers and to ashes. The same idea, but not the same decisiveness, attends Dr. William Gilman Thompson's contributions to occupational health. For a single decade, but more accurately for 12 years (1907-1919), Gilman Thompson was the firebrand of occupational health, at a time when in the United States that branch of medicine was in shadowy existence. At his prime in calendar years, his flame in occupational health, like Wordsworth's in poetry, quickly was quenched to ashes.

It may not be urged that Gilman Thompson is one of industrial medicine's forgotten men. Rather he is the undiscovered man of industrial medicine. His sizeable and admirable parcel of contributions to the medicine of industry was caught in some eddy in the stream of history and failed to float down into ensuing decades. That statement is not fully true since Garrison's *History of Medicine* rightly finds a place

Industrial Medicine's Hall of Fame

William Gilman Thompson, M.D.

1856-1927

for Thompson and the early books on occupational health in the United States, having historical sections (Kober and Hanson, and Kober and Hayhurst) aptly recognized his place in history. Look as you may elsewhere and the Gilman Thompson record is gossamer.

The purpose of this exploration is to probe the enigmatic position of Gilman Thompson in occupational medicine and in small measure to rescue him from a strange and little deserved oblivion.

Gilman Thompson was a medical Brahman of New York City. Foremostly he was the internist, the educator, the medical organizer, the university professor, in private practice sought out by the "carriage trade," the responsible public character, a medical reformer, a medical John B. Andrews. He was a man of parts with his vigorous hands and mind devoted to endless projects.

This remarkable person was never an industrial physician. Instead he was a clinician of occupational diseases as he saw them in the wards of New York hospitals. At his time any large general hospital could furnish abundant material for a staff or student clinic on occupational diseases in any week in any year. Preventive medicine for industry lay far ahead. The consequences of its absence consistently were demonstrable in the beds of any hospital. Right there was Gilman Thompson's identification with industrial medicine, but what he saw and what he learned was carried to many meetings, many organizations, many writings and many activities close to labor legislation.

Early records of the Industrial Medical Association (under its former name) are far from complete. At the moment it is uncertain that Gilman Thompson ever was a member of that body. In the panoramic picture of that sizeable gathering of physicians in Detroit in 1915, the peak year of Thompson's glory in occupational health, there he may stand, face and figure, but still unidentifiable. Distinctly he was not prominent in that organization in the 12 years he survived the formation of that group.

Scarcely is it proper to attach the label of "avocation" to Thompson's participation in oc-

cupational health. That term bespeaks a detachment from the main stream of endeavor. That was not the case. For a period, occupational diseases were the object of intense energetic effort in the midst of other energetic efforts. Likewise the term "dilettante" is an unworthy characterization of this man with regard to occupational health. That term smacks of dabbling and puttering. Thompson was no dabbler. Everything he touched was handled wholesouled, hammer and tongs, mind and body. Rather he is to be marked as a "period piece," a period man. This was the era of the rise of workman's compensation, the discovery of the workman as a human being, the Josephine Goldmark days, the innovation of the "safety" movement. Now the enigma that is Gilman Thompson begins to ravel. For a decade and more, in his forceful life, Gilman Thompson, the internist, espoused the arrival of industrial medicine in its occupational disease form. Yet in totality, Gilman Thompson, the internist, Gilman Thompson in occupational health, Gilman Thompson as the magnificent figure in medicine belongs to internal medicine, but industrial medicine relinquishes none of its claim on him as one of its own.

The chief tangible heritage of Gilman Thompson in occupational health is his book, *The Occupational Diseases* (New York: D. Appleton and Company, 1914). This book was the first text on occupational disease in the United States. It is accurate as far as the period permitted. The extent of coverage is enormous. The author describes far removed diseases that he could not possibly have seen. Part of the enigma soon to reach denouement concerns the source of all this material. That is no puzzle. Gilman Thompson spent years as a student in Europe, notably in Germany. He probably spoke and read German like a native. In the United States there were no shelf-loads of published lore on the occupational diseases of this country. But Germany already was highly developed in the clinical aspects of occupational disease, but not in prevention, which even to this day has not been discovered there. Moreover, Thompson was surrounded in New York by social reformers engaged in seething activities that presaged a social revolution in this country. John B. Andrews may be accepted as a suitable archtype. These were the collectors and importers of the results of Europe's social pursuits, including a wealth of material on occupational diseases. All that Gilman Thompson needed was at hand. The enigma further fades.

His book is little documented. There is no organized bibliography and citations appear sparsely. Were there disposition to do so, this author might be charged with flagrant plagiarism. At a much earlier time (1837) in this country's first book on occupational health by a physician, the author, Benjamin McCready, in puerile guilelessness pointedly stated that his manuscript in its main endeavor was but a rewrite of Thackrah's English publication of recent priority. Thompson, without extending any credit at all, borrowed long sections from European publications. Some rearrangement suggests awareness of a negligent practice. Of course, much the same marks present day pursuits, but all such now is labeled "research."

In the introduction to his book, now a collector's item, Thompson provides the best insight into his motivations in occupational diseases. Some excerpts serve the purposes of this exploration:

"It has come to pass that in complex modern civilization the evolution of new machinery and apparatus, new varieties of food and drink, new occupations and habits of life — in a word, of the entire social environment — has been accompanied by the employment of new poisons in the mechanical arts, new poisons of inhalation, new uses for the muscles, new strains of the nerves, and new stress of the mind. Many of these factors operate most insidiously, others more acutely, but, sooner or later, tend to injure the structures of the body or alter its activities in a manner to produce what fairly may be regarded as definite occupational diseases or disorders, many of which affect longevity and mortality in very striking degree.

"In the hospitals and dispensaries of New York City, with its varied industries and large foreign population, is a wide field for the study of this subject. The writer, in the course of many years' connection with the visiting staffs of the New York, Presbyterian and Bellevue Hospitals, and with the Cornell University Medical College Dispensary, has had exceptional opportunities for practice among such occupational diseases, particularly those which give origin to many disorders of the circulatory, respiratory and nervous systems.

"June, 1910, was signalized by the meeting in Chicago of the first National Conference on Industrial Diseases, and in a memorial sent to President Taft by this Conference it was stated that there occur annually in the United States, 13,400,000 cases of sickness among artisans and craftsmen, many of which are attributable to occupation hazards, involving a total annual economic loss of nearly three-fourths of a billion dollars. A second meeting of this Conference under the auspices of the American Association for Labor Legislation was held at Atlantic City in June, 1912, and at a joint meeting with the Section on Hygiene and Public Health of the American Medical Association valuable sum-

maries were presented of different phases of the occupational diseases.

"A number of independent organizations have established committees for the study of occupational diseases. Such, for example, are the New York Academy of Economic and Social Science and the New York branch of the American Chemical Society.

"In November, 1911, I organized in New York City an informal committee with the object of studying the occupational disease situation, both local and general, and especially for cooperating with the State Labor Bureau in furtherance of its investigations. This committee was composed of experts in industrial chemistry, medicine mortality statistics, and employer's liability, labor legislation, social service, the science of economics, and philanthropic service; and this method of organization may be recommended to those desiring to pursue the study of the occupational diseases in other large centers of industry."

What the medical profession thought of Gilman Thompson is reflected in two items to follow. One appeared when the doctor was in his prime. The other marked his death in 1927:

"William Gilman Thompson - Professor of Medicine, Cornell University Medical College, New York City. Dr. William Gilman Thompson, the son of Elizabeth Coit Gilman and Joseph Parrish Thompson, a clergyman, noted author and orator, was born in New York City, December 25, 1856.

"Dr. Thompson prepared for college in the schools of New York City and at the Karlsruhe Polytechnicum in Germany, where he spent the year of 1873-1874, and matriculated upon his return to the United States at the Yale University Sheffield Scientific School, from which he was graduated in 1877.

"After a year in the College of Physicians and Surgeons in New York, Dr. Thompson went abroad in 1879 to continue the study of medicine and studied for one year at the Berlin University and Kings College, London, where he came under the instruction of Professors Virchow, von Langenbeck, von Leyden, Senator, and Sir Joseph Lister. After studying in the clinics of Berlin, London and New York, he was graduated in medicine from the College of Physicians and Surgeons of New York City in 1881. Until 1883 he served as Interne in the New York and State Emigrant Hospitals and since then has been engaged in active private practice, consisting of a large consulting practice in general medicine and in teaching.

"Formerly Dr. Thompson was Assistant Visiting Physician to the New York Cancer Hospital and Visiting Physician to the New York Hospital and Bloomingdale Asylum, and at present is Visiting Physician to Bellevue and Presbyterian Hospitals, and Consulting Physician to the New York State Woman's Hospital; New York State Hospital for the Ruptured and Crippled; Nassau Hospital; Lawrence Hospital, and the Northern Dispensary.

"In 1887 Dr. Thompson was appointed to the Chair of Physiology in the New York University Medical College and held this position for nine years when in 1896 he received the appointment of Professor of Therapeutics and Materia Medica in the same college. In 1898 he accepted the Chair of Medicine in Cornell University Medical College and for the last 12 years has continued in that office. He has devoted much time to original experiments in Physiology and Clinical Medicine.

"Dr. Thompson is a member of the Board of Managers of the New York Botanical Garden and of the Council on Medical Education of the American Medical Association. He interests himself strongly in professional organizations and has always taken a prominent part in them. He is a member of the following organizations: Association of American Physicians; American Medical Association; New York State Medical Association; New York County Medical Association; New York Practitioners' Society; New York Clinical Society; New York Medical and Surgical Society; Associations of the Alumni of the Presbyterian, New York and Bellevue Hospitals; New York Academy of Medicine (of which he was a former Vice-President and is at present a Trustee); Century Association, and University Club.

"As an author on professional subjects Dr. Thompson is well known. Besides many medical society addresses, college lectures and so forth, he has written clinical papers on such topics as Typhoid Fever, Pneumonia, Gastric Ulcer, Carcinoma, Exophthalmic Goitre, Septic-endocarditis and Pernicious Anemia; articles on medical education, training of nurses, and hospital construction; also papers on Experimental Physiology, including "Brain-grafting," the "Use of Mechanical Models in Teaching Physiology" and "Instantaneous Photographs of the Heart in Motion." He is the author of *Training Schools for Nurses*, 1883; *Practical Medicine*, 1900, and *Practical Dietetic*, which went through four editions, the latest in 1909; Editor of the *Loomis-Thompson System of Practical Medicine*, 1898, and a contributor to Wood's *Reference Handbook of the Medical Sciences*, and Pepper's *An American Textbook of the Theory and Practice of Medicine*. He is a member of the Medical Reserve Corps of the United States Army." (*Medical World*, 1911)

"Dr. William Gilman Thompson, professor emeritus of medicine at Cornell University Med-

ical School, died suddenly of heart disease at his home in this city (New York) on October 27th at the age of seventy-one. Dr. Thompson was born in New York City, educated at Yale and took his degree in medicine at the College of Physicians and Surgeons in 1881. He taught physiology and pharmacology in New York University Medical College and for thirteen years was professor of internal medicine at Cornell University Medical School. He was consulting physician to Bellevue and several other hospitals and the author of books on practical therapeutics, on dietetics and on occupational diseases.

"Dr. Thompson was a man of great force of character and untiring energy. He introduced the principle of reeducation into hospital work, organized a functional reeducation clinic during the war and from this built up the Reconstruction Hospital of which he was the energetic president until just before his death. He was for years chairman of the Industrial Hygiene Division of the New York Labor Department, organized to carry out a scientific study of hygienic conditions in the various industries." (*Medical Journal and Record*, New York, 126: 632, 1927)

No man who becomes great ever is born too soon. Dr. Gilman Thompson may have been an isolated stalwart in his day, but the fact that he lived, worked and wrote as he did and when he did, paved part of the way toward what occupational medicine is today.

EDTA for Atherosclerosis

The possibility of a semiannual course of treatment to control coronary artery disease, number one killer in the U.S., was reported on May 7 at the Hahnemann Medical College and Hospital Symposium on Metal-Binding in Medicine at the Drake Hotel in Philadelphia.

Considering the high incidence of coronary disease, Lawrence E. Metzer, M.D., and J. Roderick Kitchell, M.D., of the Department of Cardiology, Presbyterian Hospital, Philadelphia, have brought a ray of hope to the overwhelming number of persons incapacitated by this crippling disease, estimated by recent studies to occur in 73% of all American between the ages of 50-60.

Reporting on a series of experimental treatments of 10 men with long case histories of coronary disease, the doctors said that "the combination of all of these signs of improvement (the reduction of angina (pain), the improved electrocardiograms and the decreases in heart size) occurring after therapy lead us to believe that chelation, or metal-binding, with disodium EDTA may well be an effective treatment for coronary atherosclerosis."

This improvement occurred dramatically more than three months after the end of the administration of the experimental medication.

Previous reports by a Detroit physician, Norman E. Clarke, M.D., on the treatment of coronary disease with repeated intravenous injections of disodium EDTA described "unusual symptomatic relief" in 19 of 20 patients and the return to normal of six previously abnormal electrocardiograms. On the basis of this report, Dr. Meltzer and Kitchell initiated a similar program of treatment among patients who were considered disabled because of severe, persistent angina pectoris that had not been controlled with previous therapies. Each patient had been under study for at least one year previously, and the pain patterns, exercise tolerance and work abilities were well known. Their ages ranged from 51 to 73 years.

The course of therapy was started in September 1958. Disodium EDTA was administered intravenously 2-4 times a week. The average injection contained 3.5 gm. of the chelating agent in 500 cc. normal saline solution which was given over a 3-4 hour period, under constant nursing supervision. After 20 infusions, a rest period of 10 days ensued. Electrocardiograms, blood counts and urinalyses were obtained regularly and a questionnaire was completed with reference to the anginal syndrome, exercise tolerance and side-effects.

After a period of 3-4 months, it became necessary to discontinue therapy. This decision was prompted by the fact that all of the patients were discouraged and none of them considered himself improved after this time. Transient periods of angina relief had been described, but the effect was not sustained, and there was no evidence of improvement.

Two-three months after discontinuing treatment, certain patients described obvious improvement. The group was then recalled and restudied. Certain definite changes had occurred during this interim. Nine of 10 patients now noted definite reductions of the anginal of therapy. The relief appeared to be sustained and was accompanied by decreased nitroglycerine usage and increased work capacities.

Other than the relief of angina, it was noted that of the nine previously abnormal electrocardiograms, five were now considered improved. The most significant improvement was found in the three patients with enlarged hearts — it was apparent from chest films that in each of these patients the heart had decreased in size. One patient showed an apparent decrease in the degree of calcification of the aortic valve, associated with the decrease in heart size. No significant undesirable side effects directly related to this treatment were noted.

For many years, the American Industrial Hygiene Association was one of the five organizations participating in the annual Industrial Health Conference. The hygiene association has now elected to become disassociated from the Industrial Medical Association in the presentation of the conference. The letter reprinted below was sent from the President of the AIHA to all members of the Association. It explains the hygienist's attitude in withdrawing from the Industrial Health Conference.

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION

Dear Member:

The Board of Directors of our Association has instructed me to inform you of a recent decision of the Board relative to the Association's participation in the annual Industrial Health Conference. On this date, we have notified the Industrial Medical Association, as well as the American Association of Industrial Nurses, American Association of Industrial Dentists and American Conference of Governmental Industrial Hygienists, that in 1961 the American Industrial Hygiene Association will not schedule its annual meeting in conjunction with the Industrial Health Conference.

This decision was reached after careful review of the current proposals of the Industrial Medical Association, relative to the management of future conferences, and the effect of these proposals on your Association.

I am sure you will be interested in the events leading to this decision. In October, 1958, a Committee, comprised of the Executive Secretaries of the five organizations participating in the Industrial Health Conference, was established to review plans for management of future Industrial Health Conferences. This Committee, without official title, became known as the "Industrial Health Conference Reorganization Committee," and met in Chicago on March 4, 1959. In advance of this meeting, the AIHA representative had prepared a proposal, establishing the Industrial Health Conference as a legal entity, managed by duly appointed representatives of each of the Associations participating in the Conference. In the absence of any other prepared proposals, the plan was reviewed and modified in accordance with the wishes of the representatives of the other Associations. In general, there was no disagreement amongst the five representatives in the basic philosophy that each of the five organizations comprising the Conference should have an authoritative voice in the over-all management of the Conference. This concept would assure operation of the Conference in a logical, business-like and democratic fashion.

At the April meeting in Chicago, your Board of Directors approved the proposal as modified and agreed upon by the executive secretaries of the five associations. However this plan was rejected by the Board of the Industrial Medical Association, on the grounds that the Industrial Health Conference was initiated by IMA; that through the years they have had complete control of management of the Conference, and that their business offices, salaries, rent, etc., were geared for continuation under such a financial arrangement. At the same time, IMA abolished the "Industrial Health Conference Reorganization Committee."

Sincere efforts were then made by the Executive Committees of both IMA and AIHA to re-

solve the differences relative to management of the Conference.

In June, 1959, the Industrial Medical Association notified us that future conferences would be managed essentially as in the past. However, IMA anticipated making changes in accounting procedures, such that AIHA would be charged a greater proportion of expenses of operating the Conference. Such charges could eliminate any profit to AIHA from the meeting, and conceivably require an expenditure of funds from our Treasury to participate in the Industrial Health Conference. IMA reiterated its position that it reserves the right to make final decisions on the following: (1) the selection of sites and facilities for annual meetings; (2) control of income, expense and distribution of profits; (3) selection of an exhibits manager; and/or (4) selection of a convention manager.

It is apparent that IMA has rejected the concept of conducting the Industrial Health Conference on a partnership basis, and for this reason our Board of Directors regretfully reached the decision to discontinue meeting with the Industrial Health Conference. Your Board has assured IMA that its action in this matter in no way changes its high regard for the Industrial Medical Association, its officers, members or its aims, nor does it reflect in any way on AIHA's support of other common goals of the two Associations. It should be pointed out that the action of the Board does not eliminate the possibility of our Association meeting jointly with other groups with whom we have common interests, if such joint meetings can be managed on a partnership basis.

The Board has selected the Sheraton Cadillac Hotel in Detroit, Michigan, as the site of the 1961 meeting of AIHA, the dates being April 9 through 13th. Plans for the 1960 meeting in Rochester, New York, as part of the Industrial Health Conference, are proceeding as originally scheduled.

Very truly yours,
Elmer P. Wheeler
President

Abstracts

"Use of Teflon Mesh in the Repair of Musculofascial Defects"

by L. G. LUDINGTON and E. R. WOODWARD in *Surgery*, August, 1959

This is a preliminary report of 26 hernia cases repaired with the new plastic polytetrafluorethylene (Teflon) as a fascial substitute. Inasmuch as it is known that 75% of recurrent hernias appear within the first two years after surgery, these cases will be followed for at least 24 months before making conclusions. However, our experience with Teflon convinced us of the superiority of the loose weave Teflon fabric which can be quickly and completely incorporated with fibrous tissue even in the presence of infection. In two of the three cases that developed infection, where tightly woven Teflon fabric was used, the graft had to be removed before healing took place. It is our opinion that Teflon is a promising fascial substitute, superior to other plastic materials used heretofore, and having many advantages over Tantalum mesh. These advantages are its ease of handling, its availability and low cost as compared to Tantalum, its proven strength in body tissues over long periods without chemical deterioration or fragmentation, and its inertness to body tissues which equals that of Tantalum.

For the inguinal hernias, the Teflon grafts were used to reinforce the transversalis fascia or replace it if deficient. In the postoperative type of hernia, no attempt is made to dissect out the various abdominal layers. These large hernias have only a thin layer of skin and peritoneum holding the abdominal viscera. The skin and peritoneum are opened and the fascial ring is palpated and outlined. Adhesions between abdominal viscera or omentum are carefully separated to a distance of about two inches beyond the fascial margins around the defect. A piece of Teflon mesh is cut to appropriate size and a small cuff is turned up along the edge of the graft. Sutures are placed, first through this folded margin then through the peritoneum and fascia from within out, approximately one cm back from the edge of the defect to insure a strong bite. After the prosthesis has been in place, the fascial margins can be sutured over the prosthesis if this can be done without tension. If not, then the subcutaneous and skin layers are approximated over the Teflon after first excising any excess skin.

—W. A. WICHOWSKI, M.D.

Indications for Operation for Abdominal Trauma

by W. REQUARTH in *Surgery*, August, 1959

The early diagnosis and management of abdominal trauma is a most rigid test of the surgeon's diagnostic ability and clinical judgement. An acceptable degree of accuracy in diagnosis is accomplished only by frequent examinations and by a policy of "wait and see"; yet to wait too long may cost the patient his chance for

survival and surgical cure. During the period of initial observation blood is given according to the patient's needs. An intranasal gastric tube is inserted and the contents are examined for blood. The tube is left in, a catheter is inserted into the bladder, and a supine and upright x-ray film of the abdomen are obtained. It is helpful in diagnosis to try to determine whether the dominant clinical signs are due to hemorrhage or peritonitis. A confusing condition which occurs in 60% of the cases without intra-abdominal injury is reflex ileus. Although it is helpful to know the exact diagnosis prior to operation, this is not nearly as important as reaching the correct decision regarding the need for operation. The exact hour for operation depends upon the response of the patient to replacement therapy and those who remain stabilized are the best candidates.

In nonpenetrating wounds of the abdomen the organs most frequently damaged are the kidneys, spleen, liver and the gastrointestinal tract; with an over-all mortality of about 20%. Rupture of the spleen is the commonest major injury that requires operation. Trivial accidents may rupture the spleen, especially in children, because of the resiliency of the rib cage. The presence of fractured ribs on the left should alert the surgeon to the possibility of splenic rupture rather than divert his attention from it. Most important is to realize that splenic rupture falls into three types; classic, subcapsular and delayed rupture. Each of these produces a different clinical picture.

Clinical signs of rupture of the liver are dependent almost entirely upon internal hemorrhage. Needle aspiration of blood from the abdomen establishes the diagnosis. Duodenal rupture is a lethal and deceptive injury chiefly because the rupture is retroperitoneal and no contents reach the peritoneal cavity early to produce signs. The most consistent early finding is persistent deep tenderness. On x-ray, escaping air may outline the kidneys or show obliteration of the psoas shadow. Rupture of the intestine occurs more often as the result of a sharp thrust such as a kick of an animal or a "run over" accident in children. If the perforation is large or the colon is perforated, the onset of peritonitis is not delayed and symptoms appear early. Kidney injury is the most common visceral injury, but the majority recover without operation. Excretory urograms are unreliable the first 24 hours since they normally show nonfunction even without damage. Retrograde pyelography, when possible, will show the extent of damage. Urinary bladder rupture almost always occurs as a complication of fracture of the pelvis. The most common type is the retroperitoneal rupture in which symptoms are obscure until extensive extravassation has occurred. A cystogram makes the diagnosis.

Along with the penetrating wounds of the abdomen, associated wounds may be present, but with few exceptions the definitive treatment of a penetrating wound of the abdomen takes precedence over all else. The time relationship between injury and surgical treatment has more of a direct relationship to mortality than in any other condition. There are no insignificant penetrating wounds of the abdomen. A wound is diagnosed as superficial only if intact peritoneum is demonstrated in the operating room. Unlike knife wounds in which viscera slips away from the path of the knife, a bullet rips through the abdomen and seriously damages all structures in its path. In such cases it is best not to attempt to replace blood prior to operation, but to do it along with surgery.

—W. A. WICHOWSKI, M.D.

"Treatment of Giant-Cell Tumor of Bone"

by EINER W. JOHNSON, JR., M.D., and DAVID C. DAHLIN, M.D., in *Journal of Bone and Joint Surgery*, July, 1959

The material in this review consists of a series of 116 consecutive cases of giant-cell tumor taken from the files of the Mayo Clinic. For the purposes of this study, a recurrence of the lesion following treatment was considered to have taken place when the patient received any treatment three months or more after completion of the initial therapy. A successful case was one in which no recurrence was noted after initial therapy. Since many of the patients received various types of treatment, they were all grouped into five categories according to the primary treatment. These categories are as follows: (1) patients treated by curettage, (2) patients treated by excision, in which the entire tumor and its encasing shell of bone were removed, (3) patients treated by amputation, (4) patients treated by irradiation and (5) miscellaneous.

Patients treated by curettage: This group consisted of 71 patients subjected to 146 separate treatment sessions, which included various combinations of therapy including curettage with or without grafts, preoperative and postoperative radiation and chemical cautery of the cavity.

Successful results from curettage, that is freedom from recurrence during the period of follow-up, were obtained in 30 of the 71 patients. In the remaining 41 patients, the tumor was judged to have recurred because additional treatment was considered necessary three or more months after completion of the primary therapy. Seventy

and four-tenths percent of the 71 patients were free of recurrence at the end of one year, but after five years this figure dropped to 45.9% and 40.4% at the end of 10 years. Twenty-one of the 41 patients with recurrence had it within the first year and another 10 patients had it within the second year after completion of the primary treatment.

Patients treated by excision: The tumors of 14 patients were treated primarily by excision, and those of another four were completely excised after failure of curettage and ancillary measures. Twelve of the 14 patients had no recurrence while being followed for an average of 16.2 years; however, six of these died from unrelated causes. Two had unsuccessful results.

The authors believe that it is significant that of a total of 18 patients treated by excision, 16 have had successful results with a follow-up period averaging 14.9 years.

Patients treated by radiation: Irradiation was not successful in controlling the tumor in any of 13 patients so treated. Radiation therapy was employed at some time for 74 of the 116 giant-cell tumors. Its effect was usually difficult to evaluate. In some instances, sloughing of the wound, radiation dermatitis, atrophy of the extremity and persistent drainage from the tumor site occurred after its use. It is the opinion of the authors that little justification for either pre- or postoperative irradiation is evident from their series except for tumors so situated that adequate surgical treatment is impossible.

Patients treated by amputation: Amputation was the primary form of therapy in 16 cases for a variety of reasons including diagnosis of malignancy, extensive bone destruction, severe disability, infection and hemorrhage. Fourteen of the 16 patients were followed for more than five years. Three of these died from other causes. In none was a recurrence noted.

The authors state that a total of 10 sarcomata developed after treatment for giant-cell tumors which were originally no more anaplastic than the remainder of the 116 lesions, and the authors comment that the longer their cases of giant-cell tumor were followed, the higher the rates of recurrence and malignant transformation become.

The authors believe that following review of this series, it is evident that curettage is not the ideal treatment. In 29.6% of patients treated by this method, recurrences developed within the first year after therapy and at the end of five years those with recurrences had climbed to 54.1%. In addition to this high rate of recurrence, approximately 10% of giant-cell tumors become frankly malignant and a very occasional one produces metastasis even though histologically benign. Radiation therapy alone was not successful in controlling any of the giant-cell tumors in this group.

Although only a small part of the total series, those tumors for which complete excision along with removal of all surrounding shells of bone and fibrous tissue was attempted are an important group from the standpoint of successful treatment. The authors believe that excision is the one successful treatment for these tumors. —JOHN H. SCHNEEWIND, M.D.

Books

Hernia

By *Sir Heneage Ogilvie* (London: Edward Arnold Publishers, Ltd., 1959)

This 135 page little book is one of the best written on the subject of hernia. The author has his own method of inguinal hernia repair, using a "thread lattice" of linen in the posterior wall of large hernias. That, and his use of catgut in some cases, may be subject to criticism by some surgeons in the United States. His analyses of the anatomical and physiological problems are excellent, as is his discussion of suture materials. He outlines his objections to 14 different techniques of inguinal herniorrhaphy, including the popular Bassini and Cooper ligament methods, and this reviewer endorses his objections. His chapter on Recurrent Hernia is one of the few articles on the subject. The use of wire mesh is barely mentioned and no personal statistics are given. Femoral and umbilical hernias are well discussed. This volume is highly recommended for all students of the hernia problem. —CHESTER C. GUY, M.D.

Cancer

Ed. *R. W. Raven* (London: Butterworths, 1959) six volumes, $18.00 per volume

The scale of this six volume series is heroic. It is not easy to grasp the extent of labor necessary even in the editing of this massive material all devoted to cancer and prepared by scores of investigator the world over. Volume I is directed chiefly to cancer etiology. That volume contains an elaborate section of 93 pages concerned with environmental factors in the production of human cancer and this chiefly becomes the occupational causation of human cancer. Volume II is directed to cancer pathology. Volume III contains sections on the Geography of Cancer, Occupational Cancer, Cancer Education and Cancer Detection. Volume IV is devoted to the clinical

aspects of malignancy. Volume V, not yet published, is concerned with radiotherapy in cancer while the last, Volume VI, not yet published, is divided between chemotherapy of cancer and the public health aspects.

While this series is of British origin, its scope is without national boundaries. The list of editors includes investigators from many countries although numerically the domination is British.

The editor makes this statement concerning the range of appeal for this monumental assembly: "The value of the work to literally the whole of the medical profession cannot be overestimated. It is not often that it can be claimed that any particular work is needed by every medical man, but here is one that should be read and used by pathologists, surgeons, both general and specialist, physicians, research workers, radiotherapists, hospitals, cancer organizations, epidemiologists, statisticians, and indeed anyone who is connected with the struggle against this disease."

It is probable that the main appeal to those in the field of occupational health resides in two volumes: Volume I, with its elaborate consideration of occupational cancer causation and Volume III, with a large portion devoted to selected aspects of occupational cancer as follows: "Occupational Leukaemias," Ethel Browning, London; "Occupational Cancer of the Skin," R. Murray, Manchester; "Occupational Cancer of the Urinary Bladder," M. H. C. Williams, Manchester; and "The Medicolegal Aspects of Occupational Cancer," J. Watkins Pitchford, Beckenham, Kent.

Anyone familiar with the offerings of this gigantic series may be accepted as one in touch with cancer in all of its ramifications.

In the purchase of any one or all of these volumes, it is not necessary to turn to the British publisher. These books are procurable in the United States through: C. W. Alban & Co. Inc. of St. Louis, Brown & Connolly Inc. of Boston, Chicago Medical Book Co. of Chicago, George Eliot Medical & Scientific Books of New York, J. A. Majors Company of Dallas, Rittenhouse Medical Book Store of Philadelphia and J. W. Stacey Inc. of San Francisco.

The Preservation of Eyesight

by *Sir Arthur Salusbury MacNalty* (Baltimore: The Williams & Wilkins, Co., 1959) illustrated, $3.00

"Of these five senses," wrote Robert Burton in *The Anatomy of Melancholy*, "sight is held to be most precious, and the best, and that by reason of his object; it sees the whole body at once; by it we learn and discern all things, a sense most excellent for use." Sight makes us acquainted with the world around us; it helps to protect us from external injury; it contributes the largest store of information; it reveals to us the beauties of color, shape and form, the treasures of nature, the glories of earth, sky and sea, the faces of those dear to us, knowledge through the written work, and the wonders of science through the microscope and telescope.

The deprivation of eyesight is the hardest to bear, yet men and women have courageously overcome this handicap and have made their contribution to human progress. Instances are ready to hand. The blind John Milton dictated *Paradise Lost* to his daughters; Louis Braille, who became blind at three years of age, invented a system which has enabled the blind to read and write, and thus has been of infinite solace to them; Henry Fawcett, blinded at 28, had a successful political career, became Postmaster General, and introduced the parcel post, postal orders and sixpenny telegrams; Joseph Pulitzer, the famous editor of the New York World, continued to control and direct the work and policy of his newspaper when deprived of eyesight; Helen Keller, who became deaf and blind at 18 months, graduated in arts and has attained high distinction as writer and scholar.

In fiction the pathos of blindness has not infrequently been described: for example, Nydia, the blind Greek girl, in Bulwer Lytton's *Last Days of Pompeii*, and *Poor Miss Finch* in Wilkie Collins' novel.

In contrast to these some novelists have created blind villains of the melodramatic order. Dickens drew Benjamin Stagg in *Barnaby Rudge*, and what reader of Stevenson can forget the shuddering thrill evoked by the blind Pew tapping with his stick in *Treasure Island?*

This book of English origin is not for consumption by the medical profession except as "good and engaging reading." It is pitched at the level of the trainee in practical nursing but well might serve as a text in high school and college training in vision and eyesight. Its chapter headings reveal much as to its coverage: The Structure and Function of the Eye, How We Use Our Eyes, Nutrition of the Eye, Defects of the Eye, Lighting and Eyesight, Common Affections of the Eye, Diseases of the Lens, Retina, and Optic Nerve, Temporary Loss of Sight, The Eye in Old Age, Blindness, The Prevention of Diseases and Injuries of the Eye in Industry, Eye Testing and Spectacles, Care of the Eyes.

When the physician's patient says, "I wish I could get a small, simple book that would tell me all about my eyes and how they work," this is that book and perhaps none is better.

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November, 1959

VOLUME XXVIII

NUMBER 11

The Pursuit of Equanimity

Dr. Leo Fishbein, writing in *American Practitioner* for June, 1959, has made pronouncements that deserve an even wider dissemination than provided by the journal of first publication. This condensation, while unequal to the article in its entirety, hopes to have captured the pith and gist of the whole.

The world of science and social progress has been looking for a five-cent tranquillizer that will spell happiness for any one who carries, eats or rubs the magic gadget as the need arises for pleasure and joy. The wish becomes the reality; one has only to say he has peace of mind and presto — there it is!

Man has given so much time to the outside world in his struggle for survival that he has altogether lost sight of the Unknown Continent of himself that has been buried through millions of years of evolutionary resurgences. The pursuit of equanimity in this complicated world must first be sought within one's self and reality. Man must understand his dualistic drives, his conscious and unconscious strivings (and contradictions) for those dichotomous needs that constantly demand time and effort in a baneful world that has all the elements of destroying him.

Too many are handcuffed to their sorry maladjustments and in their own cells are tormented by Dybbuks that ruin their lives. Most individuals prefer the prison of known ignorances and evils and avoid the unknown changes for the freedom of the self. Why is this so? Most individuals who lack maturity in the emotional field prefer maintaining the status quo to making any changes, because this is accomplished with less effort and is more easily understood. Changing the status quo may bring along new, strange incidents that seem difficult to manage. Look to the nations of the world which are similar to the status quo individuals. See how the status quo policies have led to decadence in mutual understanding. Persistence in the cold war atmosphere has filled the minds and hearts of two billion humans with acute anxiety and despair, regardless of the size of the budget or the protective equipment proposed.

It can be shown conclusively that illness will occur when an individual tries to change what he must accept in life, such as an amputated limb. Illness will also occur when an individual tries to maintain a condition that he ought to change. Psychiatrists see too many people suffering from emotional revolutions and turmoil, hoping that these will pass without notice. They sadly realize that the upheavals have thrown them offbase with conditions that must require delicate reconstruction and rehabilitation.

Why is this so? Because it is easier to wish problems away than to give the time and energy to become more aware of the exigencies and then take action, with professional help, to clear up the sad situation. Many women exhaust themselves and their friends by cursing the destinies of their rugged existences. In extremes, they rant and plead, demanding the "kill me or cure me" choices at once.

Equanimity is a state of well-being, often illusive and elusive. It may be had for the moment or for a short interval. No one can capture it and keep it! It is in the pursuit of equanimity that the person may catch a glimpse of it and enjoy its blessings, momentarily.

How does one go about this pursuit? The answers lie in how one goes about seeking the truth about himself and the world about him. How does he see himself? What does he want to change in the future? What efforts will he make to achieve some of these challenges, goals and the fulfillment of capacity? What are his manners with others? Does he seek equity and justice in his dealings with others? Are these just words or are there meanings-beyond-words that sometimes disguise meanings? Is he more interested in the wealth of human dignity and creativity? Is he trying to impress others more than himself? Is his facade a shallow one, full of insincerities and inadequacies? Does prestige mean more to him than the compassion, wisdom and dignity of the good life with "selfishness" directed not only to himself but others in reasonable proportion?

Self-confidence and understanding can be achieved in many ways. Our society believes it achieves it by trumpet bellows and shaggy halos. This is a deceptive manner in our society that maintains its immaturity with clarion calls for production, massive conformity and chaotic speeds that are killing off our youth and middle-aged decades too soon. Our society needs wisdom, better emotional health, more compassion and sharpened awareness through education and moral and spiritual discipline, difficult though it may appear, for the vicissitudes of the future. Those who refuse to grow up, emotionally or intellectually, will have to do it in later years. Medical literature is replete with psychosomatic ills and stresses that have their origins in human ignorance and shameful neglect of sickness and health.

Yearly Disability Days for the Average Industrial Worker

One of the figures most quoted in publications related to occupational health is the number of days yearly lost by the average worker on account of personal sickness or injury. The latest known figures are those published by the Public Health Service in its brochure "Health Statistics" dated May 1959, embracing compilation for July, 1957 — June, 1958. The entire brief section, slightly condensed, here is presented.

"An inverse relationship between disability days and income is found with respect to rates of work-loss days. Among all persons classified as "usually working" during the 12 month period prior to the week of interview, persons with family income under $2,000 lost an average of 10.3 days from work during July, 1957-June, 1958. The average days lost from work successively decreased to 5.9 days for persons with family incomes over $7,000.

Although "usually working" males and females lost about the same number of days from work during the period, July 1957-June 1958 there seemed to be a tendency for males in lower income families to lose more days from work than females in the same income class. For the higher income groups the situation was reversed, with females losing slightly more days from work, on the average, than males. The differences were not great however and all that can be stated with some assurance is that the association between income and time lost from work is more conspicuous for male workers than for female workers."

The fact that the higher the income level the lower the number of days away from work involves many implications. While the primary implication may be that sickness is of higher incidence in the lower income groups, another implication may be that among those with higher incomes the sense of obligation and loyalty to the work may be increased.

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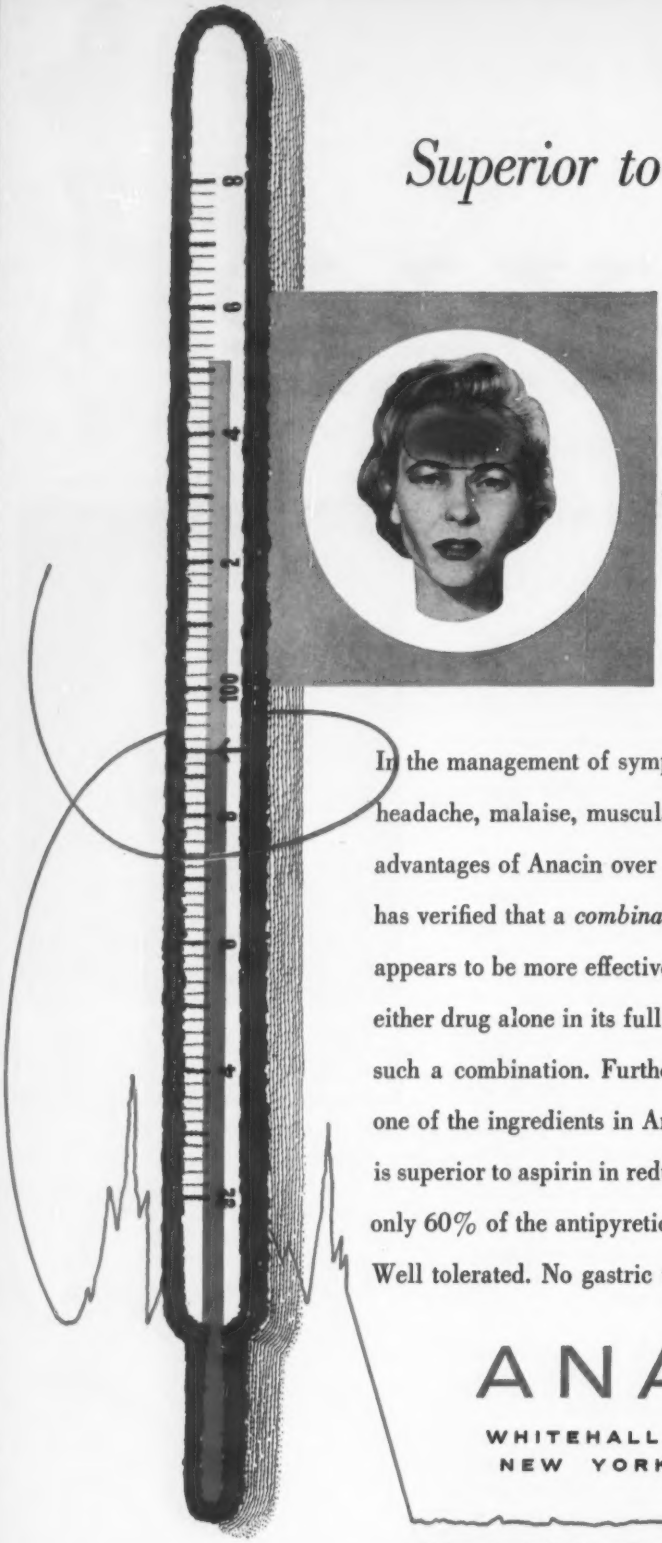

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COMMENT AND OPINION

Amorous Badinage

Patting pretty girls — even pinching them — doesn't call for discharge, says NLRB Trial Examiner John F. Funke. Ordering the reinstatement of eight men fired by a Connecticut company for "amorous badinage," Funke notes that "Contiguous employment of male and female in offices and plants has led to a relaxation of formal barriers and to a tolerance of casual badinage not entirely free from overtones of sex."

—From *Industrial Relations News*, September 26, 1959.

College Medicine

The 1,000th University of Michigan faculty member recently completed a two week executive-type health examination under a program launched three years ago.

The elective, confidential and free of charge examinations were established to maintain the health of the faculty and to check any disorders before they reach serious proportions. Invitations for the health appraisal originally went to faculty members over age 60. Gradually, the age level has been reduced so that present invitees are in the 30 to 40 age bracket.

Dr. Charles J. Tupper, Associate Professor of Internal Medicine, is director of the faculty health project. He reported that 75% of those invited to have the examination have accepted.

Truant Officers

Formation of a new Chicago firm aimed at helping companies solve their absentee problems has been announced by Miss Frieda M. Peterson, its executive director.

The service, Personnel Absentee Reports, Inc., 900 N. Michigan Ave., is termed the first of its kind. It provides graduate nurses on a part time or when needed arrangement to visit an absent employee's home or hospital and report to the employer on health conditions and expected return date.

"Absenteeism is a troublesome factor in commerce and industry," said Miss Peterson, a registered nurse for 20 years. "With this type of service, smaller companies would have much the same services as large ones receive through their own medical departments."

—From *Chicago* (Ill.) *Tribune*, August 14, 1959.

Dental Insurance, Too

Five thousand sanitation workers, their wives and children, today add dentistry to benefits which include everything from pensions to eyeglasses. Private Sanitation Local 813, the first union to cover the family for dental care, is an affiliate of the International Brotherhood of Teamsters, and has a tradition of broad welfare benefits for members and

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families alike. Dental insurance is through Group Health Dental Insurance, Inc., pioneer nonprofit dental plan in the United States.

"Our members want dental benefits for their children and wives even more than for themselves," said Bernard Adelstein, Chairman of Local 813's Insurance Trust Fund. "They want to use their own dentist if they have one or, if not, to choose a dentist in their own neighborhood. By covering the whole family in a plan that permits use of any dentist, we are adding a health benefit our members need and will use."

Local 813 brings to more than 16,000 the persons covered by GHDI. The Plan has over 4,400 Participating Dentists, or more than 40% of all practicing dentists in the area. Married subscribers with incomes of $6,500 or less, or single subscribers with incomes of $5,000 or less, get benefits without further charge if they use a participating dentist. Those earning more, or using a dentist who does not participate, pay the difference, if there is any, between their dentist's charge and GHDI allowances.

Bissell B. Palmer, D.D.S., President of GHDI, said that when a family is insured, family members tend to go together to a neighborhood dentist. Though women receive dental care more regularly than men, when both husbands and wives are insured GHDI expects higher use among men, too. "The Plan is particularly beneficial to children," said Dr. Palmer, "because it encourages parents to start them on a regular program as soon as they enroll. We know that oral hygiene and regular care enable almost all children to keep their permanent teeth for life." GHDI provides orthodontic care by specialists for children in the Plan by age six, in addition to almost every type of dental service.

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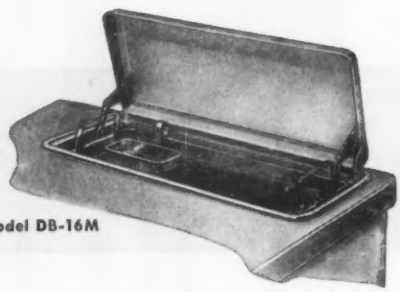

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Mumps in Dogs

There are only a few ills that go from dog to man. Ringworm is one. Children pick it up from their cat and dog pets. A newly found species of mumps go from man to dog. Measles and canine distemper virus have been found to be quite similar and in California distemper vaccine is being used for measles inoculation. The diseases are different, although the viruses are about the same. Dogs catch hepatitis, but the disease isn't the same as human hepatitis. Leptospirosis is a kidney disease usually in male dogs that can spread to humans. It's called Weil's Disease and enters through an open sore. It can be fatal, and represents an occupational hazard of veterinarians.

—*Springfield* (Mass.) *News*, September 5, 1959.

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Medical Director: MPH; 10 yrs, experience, indus med; exceptionally qual'd, indus hygiene; prefers New Eng, Calif or foreign; speaks French & Spanish; middle 40's; immediately available.

Medical Director: Seven years, group pract; now seks Indus Med position with oppor do surgery; any location; Age 36.

Assistant Medical Director: One year, Asst Med Dir, division lge important corp; presently completing medical serv, USAF; seeks position; Midwest, East or Calif; Age 28.

Industrial Surgeon: 3 yrs, surg residency; 2 yrs, Chief Surg, USAF; 1½ yrs, phy & surg US army hsp; presently Med Dir, div of lge corp; seeks assn w/clinic or surg limiting pract to Indus Surg; prefers So., SE, SW; age 34.

Staff Physician: 3 yrs, Genl Pract Res; 1 yr, Int Med Res; 2 yrs, Assoc in Genl & Ob gyn pract; 1 yr, Indus phys, lge corp; seeks Indus Med, West, prefs Calif; Age 37.

Staff Physician: Grad, Rush Med; 13 yrs, very successful private genl & surg pract; AAGP member; sevl yrs, flight surg, USAF; prefers indus med w/regular hours; no locality preference; middle 40's.

Staff Physician: Grad, Hahneman Med; 5 yrs, priv pract; 2½ yrs, hsp phy & psy; 3½ yrs, phy—some publ hlth wk; seeks Indus post; desires Ohio, perhaps foreign appt; late 30's.

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Staff Physician: 2 yrs, Med Ofc, USAF; 1 yr, priv pract; 2 yrs, Asst Phy, important foundation hsp; 1½ yrs, genl clinic pract; seeks indus med post; Fla, Ala or Georgia only; Age 37.

Staff Physician: A. B., Northwestern Univ; three yrs, private general practice; prefers Indus post; West or Northwest; Age 33.

Staff Physician: 2 yrs, Director, Blood & Plasma center; three and one-half years private, general practice; 3 yrs, Med Ofc, USAF; seeks Indus Med in SE, SW or Calif.

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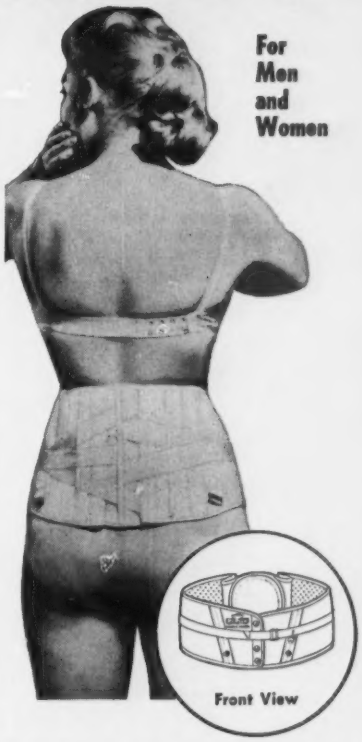

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indications: primary and secondary skin infections including pyoderma, mycotic and bacterial infections, eczema, furunculosis, minor burns, as well as staph. aureus and pseudomonas infections.

administration: apply liberally over affected area as often as needed, bandage if desired.

supplied: one ounce tube.

BETADINE™ OINTMENT

(CONTAINS POVIDONE-IODINE)

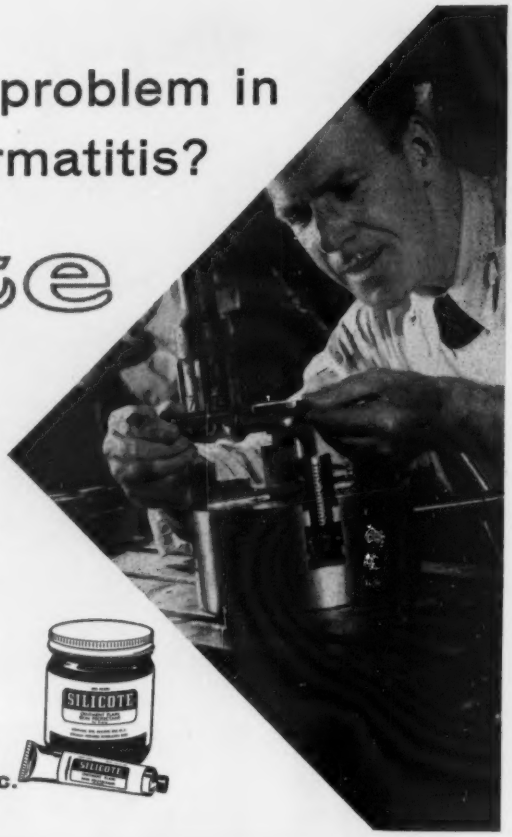
TOPICAL PATHOGENICIDE ... KILLS PATHOGENS ON CONTACT

established in 1905 TAILBY-NASON COMPANY, INC., DOVER, DELAWARE

do you have a problem in industrial dermatitis?

Silicote

SILICONE SKIN PROTECTANT



Silicote provides an effective barrier against a wide range of skin irritants. It adheres to the skin, is not easily removed, and, when properly applied, can not be seen nor felt on the skin, permitting workers performing delicate tasks to stay on the job.

PROTECTS AGAINST

—water, acids, alkalies, foods, organic materials, resins, cement, tanning solutions, inks, polishes, woods, glue, coolants, soluble cutting oils, rubber, plastics, synthetics, dyes, metals, paints, lacquers, thinners, etc.

IN TREATMENT

of contact dermatoses, Silicote clears up many cases not responsive to other therapy.

Silicote is the only preparation containing 30% silicones (dimethicone) in specially prepared petrolatum base. Silicote is non-occlusive.

May we work with you in your particular problem? Send for clinical supply.

ARNAR-STONE LABORATORIES, INC.

225 E. PROSPECT AVE., MOUNT PROSPECT, ILLINOIS

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new modern site-of-pain relief in musculoskeletal distress

GER-O-FOAM

(aerosol foam)

eases pain, spasm; improves function

Deeply absorbed to permeate affected sensory endings, the proven local analgesic-anesthetic agents in GER-O-FOAM give relief in minutes, lasting for hours in . . . rheumatoid arthritis, osteoarthritis, muscle sprain, fibromyositis, low back pain, etc.

IN A NEW CLINICAL STUDY[1] GER-O-FOAM gave "satisfactory" results in 85% of chronic musculoskeletal patients. Response was "striking" in certain intractable acute conditions . . . "permitting functional exercises otherwise impossible."

GER-O-FOAM combines: Methyl salicylate 30%, benzocaine 1%, traces of volatile oils in a specially processed, neutralized emulsion base, for aerosol use.

samples, reprint and literature from

GERIATRIC PHARMACEUTICAL CORPORATION Bellerose New York

GERIATRIC

1. Gordon, E. E. and Haas, A.: Industrial Medicine & Surgery 28:217, 1959.

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It can happen, almost without warning, to many diabetics on insulin. One moment, the patient appears normal; the next, he goes into a state of hypoglycemia, perhaps even shock. For some it is a terrifying threat with which to live.

But for many of these patients there is a rational alternative: *oral* management. On Orinase,* control is smoother, blood sugar levels are more steady – and the terror is dispelled. Some brittle diabetics are "stabilized" on combined Orinase-insulin therapy.

For *all* your responsive patients on Orinase, there is the assurance of better control and easier patterns of living.

*TRADEMARK, REG. U. S. PAT. OFF.—TOLBUTAMIDE, UPJOHN

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PROVEN EFFECTIVE FOR THE TENSE AND NERVOUS PATIENT

"There is perhaps no other drug introduced in recent years which has had such a broad spectrum of clinical application as has meprobamate.* As a tranquilizer, without an autonomic component in its action, and with a minimum of side effects, meprobamate has met a clinical need in anxiety states and many organic diseases with a tension component."

Krantz, J. C., Jr.: The restless patient—A psychologic and pharmacologic viewpoint. Current M. Digest 25:68, Feb. 1958.

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